A. P. HOWES
Publisher

M. D. REESER
Advertising Manager

AMERICAN DYESTUFF REPORTER

LOUIS A. OLNEY
Directing Editor

NORMAN A. JOHNSON
Managing Editor

DEVOTED TO THE INTERESTS OF TEXTILE CHEMISTRY
• BLEACHING • DYEING • FINISHING • PRINTING •
AND THE NECESSARY MECHANICAL EQUIPMENT

"Circulated Everywhere Textiles Are Processed"

Subscription Price: $5.00 per year; Canadian, $6.80; Foreign, $6.00. Fifty cents per copy

VOLUME 25 | JULY 27, 1936 | NUMBER 15

CONTENTS OF THIS ISSUE

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

General

Plasticity 395
By A. J. Hall

Washington News Letter 398
By Waldon Fawcett

Recent Research on Cellulose Fibers—II 414

Finishing of Textile Fabrics 416
By F. G. LaPiana

Technical Notes from Foreign Sources 418

New Products—Trade Notes 419

Open Forum 420

Proceedings of
American Association of Textile Chemists and Colorists

The Chemist as an Aid in the Detection of Crime .. P402
By William D. McNally

Hydrosulfite and Vat P407
By R. Feibelmann

Third Annual Joint Outing P411

Outing, Rhode Island Section P411

Calendar of Coming Events P412

Editorial:

Technical Notes 413

Official Publication of the American Association of Textile Chemists and Colorists

THE OBJECTS OF THIS ASSOCIATION ARE:

"To promote increase of knowledge of the application of dyes and chemicals in the Textile Industry.

"To encourage in any practicable ways research work on chemical processes and materials of importance to the Textile Industry.

"To establish for the members channels by which the interchange of professional knowledge among them may be increased."

Published Every Other Monday

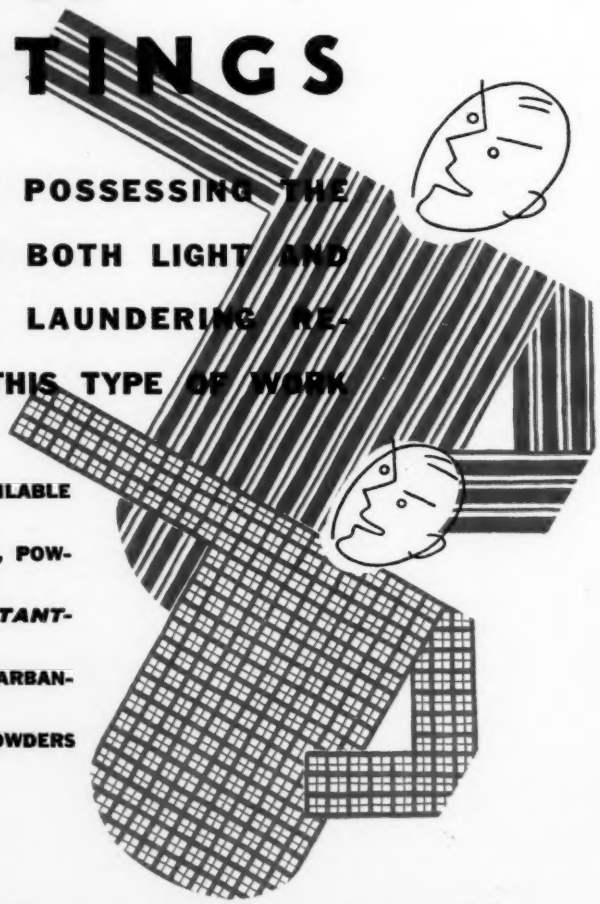
HOWES PUBLISHING CO. ≈ ≈ 440 FOURTH AVE. ≈ ≈ NEW YORK

CLOSING DATE FOR ADVERTISING COPY . . . . . MONDAY PRECEDING ISSUANCE DATE

National

VAT COLORS FOR SHIRTINGS

A FULL LINE POSSESSING THE FASTNESS TO BOTH LIGHT AND COMMERCIAL LAUNDERING REQUIRED FOR THIS TYPE OF WORK



THESE COLORS ARE AVAILABLE IN ALL FORMS; PASTE, POWDER, AND THE NEW *INSTANTLY DISPERSABLE* CARBANTHRENE PRINTING POWDERS

NATIONAL DYES

NATIONAL ANILINE & CHEMICAL COMPANY, INC.

40 RECTOR STREET NEW YORK, N. Y.

BOSTON .....150 Causeway St.
PROVIDENCE .....15 Westminster St.
CHICAGO .....357 W. Erie St.
PHILADELPHIA..200-204 S. Front St.
SAN FRANCISCO.....517 Howard St.
CHARLOTTE.....201-203 W. First St.
GREENSBORO..Jefferson Standard Bldg.
ATLANTA.....140 Peachtree St.
CHATTANOOGA .....James Bldg.
PORTLAND, ORE..646 N. Thompson St.
TORONTO ..137-145 Wellington St., W.

Branches and Distributors throughout the World

AMERICAN
DYESTUFF REPORTER

VOLUME 25 JULY 27, 1936 NUMBER 15

Plasticity

A Property of Textile Fibers Awaiting Research and Commercial Exploitation

By A. J. HALL, B.SC., F.I.C., F.T.I.

DURING many years such properties of the various textile fibers (wool, cotton, silk, etc.) as tensile strength, extensibility, luster, have been the subject of much investigation. This, it must be admitted, is as it should be, for these particular properties play a large part in determining the durability and appearance of manufactured textile goods. But unfortunately very little attention has been given to the plastic nature of textile fibers, and this is in spite of the fact that the plasticity of the fibers in a fabric largely influences its response to finishing treatments.

But this article is not only a plea that more attention should be given to this property of plasticity because a better knowledge of it could assist finishing, but rather because it is fairly certain that research would reveal how a textile fiber could be given increased temporary or permanent plasticity such that it could be made amenable to new processes and capable of transformations not now possible.

By plasticity is understood the property of a textile fiber by which it can be deformed in shape. Flattening and extenuation are two possibilities if textile finishers could control to a larger extent than at present the plastic properties of fibers. The insertion of minute twists into rayon fibers so that they would yield stronger yarns, or the formation of facets on rayon fibers to give special luster effects are two further possibilities. But on careful reflection it will be seen that there are innumerable possibilities for improving and modifying textile fibers of all kinds provided that their resistance to deformation could be controlled. The following two examples of fabric treatment will be discussed with a view to indicating how a control of fiber plasticity can help the finisher and also how a lack of this control can just make impossible a desirable finish.

The first example has to do with cellulose acetate rayon and came into the writer's practical experience a few years ago when developing a new aniline black dyeing process for this type of rayon. The dyeing process (E. P. 337,746) involved treating acetate rayon fabric with an emulsion of aniline until it had absorbed a suitable amount, and then treating it with an oxidizing liquor containing sodium chlorate, sodium bichromate, hydrochloric acid, and a large amount of sodium chloride for the purpose of preventing loss of aniline from the rayon.

The dyeing process was applied to 100 per cent acetate rayon fabric and was carried out in a jigger. In the preliminary trials comparatively short lengths of fabric were used, and as a direct consequence instead of the dyeing treatment being completed within say a dozen "ends" the fabric passed backwards and forwards through the dye liquor upwards of thirty to forty times. The jigger rollers were somewhat heavy and not on ball or roller bearings so that during its passage through the dye liquor the fabric was under a steady and appreciable warp tension. It was under these circumstances that it was noticed that the black dyed fabric was about 80 per cent longer than before dyeing. A fine fabric acquired gossamer characteristics, and this without disturbing the perfectly even texture of the fabric.

The explanation of this remarkable result was soon discovered. While the fabric was being treated in the jigger with the aniline emulsion the rayon became more and more plastic as it absorbed more and more aniline. At a point when a certain amount of aniline was absorbed the rayon yarns became so plastic that they were quite ductile and could be stretched considerably. It was not possible to stretch the fabric 80 per cent in length in one operation, but with each passage through the aniline liquor a stretch of 2 to 3 per cent was introduced. It was because the stretching was thus effected in numerous stages that the yarns in the fabric gradually accommodated themselves to the process and a regular fabric resulted.

When the aniline in the second treatment was oxidized to aniline black pigment the fabric lost its plasticity or ductility and it could be appreciably stretched no more. But the new length was permanent and no shrinkage in length occurred when the fully dyed fabric was repeatedly washed in hot soap liquors.

The above is an example in which the plasticity of the

fibers in a fabric was increased temporarily and while under control so that it became possible to modify greatly and permanently the character of the fabric. It is to such phenomena that research should be directed.

The second instance is concerned with an unsuccessful attempt to produce a high luster finish on cotton fabric without mercerization; it failed because sufficient control of the plasticity of cotton fibers could not be obtained.

It was observed that if a piece of wet cotton fabric was introduced into a calender consisting of a hot polished steel bowl revolving in contact with a paper bowl so that the fabric stuck to one or other of the bowls (usually the metal one) and therefore passed through the nip of the two bowls repeatedly until it dried and fell off, the fabric acquired a super luster which was very much greater than if the normal air dry fabric had been passed through the calender once in the normal manner. How could a method be devised of finishing fabric with this super luster under controlled conditions?

At this stage it was fortunate to obtain access to a calender having very heavy bowls of steel and cotton and provided with means for exerting an extraordinarily high pressure on fabric led between them. The steel bowl could be heated internally with burning gas and its temperature raised to a high point so that wet fabric passing through the calender was practically dried with but one passage. This calender appeared to provide the means required.

It was believed that the super luster was the result of flattening the surface of the fabric so that it behaved more like the surface of a mirror. The high degree of flattening was attained because the cotton fibers were wet during calendering and it is believed that a hot wet fiber is much more plastic than a hot dry one. In this manner it would seem evident that a super lustrous fabric could be produced by flattening the surface in a permanent way, and it was for this same reason that the special calender just described seemed most suitable for producing the finish desired.

Accordingly, a piece of wet fabric was led through the high pressure calender so that it emerged just dry and had the super lustrous character desired. It now remained to prove whether or not this luster was sufficiently permanent to withstand washing. After one or two washes followed by drying, it soon became apparent that the super luster was disappearing and when the fabric was boiled in a soap liquor a further three or four times and then dried it had lost all its pleasing lustrous character and was practically no better than the original fabric.

Here then is an example of a simple method of treating cotton fabric so that it has a luster superior to that of mercerized fabric, but unfortunately the luster is not sufficiently permanent to make the method of value. What was the reason for lack of success? Simply this—the cotton fibers were not sufficiently plastic during the wet calendering process. If in this process each fiber had behaved somewhat after the manner of potter's clay then the effort to produce a super luster without mercerization would have been successful.

Now all textile fibers have a certain amount of plasticity and generally it is considered that wool has the most. But much depends on the conditions. For many years it has been recognized that an increase of temperature and moisture content makes a textile fiber more plastic, and many finishing processes are based on this fact. Before considering other means for increasing fiber plasticity it will perhaps be helpful to review some special features of finishing which involve plasticity in a manner more subtle than is generally recognized.

The schreinering process is carried out for the purpose of giving cotton fabrics a high surface luster, and before the introduction of rayon, it was used much more largely than it is today. In this process the fabric is led through a two-bowl calender of specially heavy construction and having an upper steel bowl in contact with a lower cotton or paper bowl; the pressure between the two bowls is very high. The steel bowl is internally heated with burning gas, and its surface is engraved with parallel lines which roughly run also parallel to the direction of twist of the most prominent yarn in the fabric surface, that is, with the warp yarn in a fabric whose surface consists mostly of warp and with the weft in a weft-faced fabric. There are usually 200 to 300 lines per inch on the steel bowl.

By schreinering, the surface of the fabric becomes impressed with the lines of the steel bowl and it is this which gives the fabric its uniform lustrous appearance. Obviously, the cotton must be in a state most amenable to the impression, that is, its plastic properties are brought into play in this process.

The general conditions of schreinering are a high temperature and a moist fabric, since cotton is most plastic under these conditions. Under the microscope, the schreinered fabric can be readily seen to be impressed with the lines, for their shape can be observed and their number counted. But unfortunately, when the lustrous schreinered fabric is wetted and dried it loses the greater part of its pleasing luster, and here again is an example of a finish being spoiled for lack of control of the plasticity of the cotton. Experience has shown that the schreinered effect can be made more permanent when the fabric is processed as wet as possible. Of course, this introduces difficulties since the fabric must leave the machine dry otherwise the schreiner luster would be reduced in the subsequent drying.

Now an interesting experiment can be carried out in connection with schreinering to show one way in which the plasticity of the cotton fabric can be modified without adjustment of temperature and moisture conditions. A piece of cotton fabric ready for schreinering should be cut into two parts. One part should then be schreinered as it is. The other part should be extracted for a few minutes with hot benzene, dried, allowed to condition in air (as the first part of fabric) and then schreinered. It will be found that the second fabric has, by extraction, been made more receptive to the schreiner lines. Much

the same thing, but to a less degree, can be shown by schreinering similar fabrics except that one has been lightly scoured and the other thoroughly kier boiled. Removal of the natural cotton waxes makes the fiber more plastic.

We may now turn to the finishing of wool knitted fabric in which it is desired to produce a nice soft mellow handle by hot pressing. It will soon be found that the handle of the fabric can be modified within very wide limits according to the conditions employed. Reference is now being made to the finishing process in which tubular fabric is placed around a wood board and pressed between two steam heated steel plates. If the fabric is finished while it is definitely damp then it will leave the press having a paper-like handle while its surface will have a glazed appearance; the fabric will be so rigid that it can almost be stood upright without bending. On the other hand, if the fabric is bone dry then it is only slightly flattened and it readily loses its finished dimensions and shape when roughly handled. In these two instances, the wool exists with a large and small degree of plasticity respectively; to obtain satisfactory finishing it is necessary to control this plasticity.

Wool fibers are peculiar in that their plasticity can be modified considerably by simple changes in the conditions of temperature and moisture which surround them. It is for this reason that a wool fabric can be "set" to specified dimensions, the appearance can be modified, and the handle varied from thin to full, simply by adjusting its moisture content at the time of hot pressing.

A further simple example of this high degree of plasticity can be found in the following experiments. First wrap a wool yarn tightly around a glass rod and plunge it into boiling water or hold it over steam issuing from the spout of a kettle of boiling water. After cooling and removing the yarn from the rod it will be found to retain its corkscrew appearance quite tenaciously. Secondly, stretch a wool yarn about 50 per cent in length while held in steam or boiling water and cool it while maintaining stretch. The wool fiber will retain its increased length even when afterwards wetted in cold water.

This plasticity comes into play in the finishing of wool fabrics having a pile or plush surface. Such fabrics can be calendered without flattening the pile provided that they are fairly dry. But if the conditions of moisture content and temperature are such as to make the wool highly plastic then the fabric will become spoiled by reason of surface flattening. The finishing of such materials is obviously one in which controlled plasticity plays an important part.

The finishing of wool men's half hose is another instance where advantage is taken of the plastic properties of wool fibers, for it is by pressing the hose on boards between steam heated "beds" that the shape and size of the hose is "set."

Real silk has a high degree of plasticity especially as its temperature is raised. If a pure real silk fabric be embossed at about 100° C. under a high pressure, it will be found that the fabric can be boiled many times before the embossed portions lose their appearance. Actually, it proves most difficult to remove the final traces of embossing. Under the same conditions, a cotton fabric could be cleared of embossed effects within one or two boils. The writer has seen the appearance of silk fabric much modified by first embossing it strongly and then removing all but the last traces of the embossed effect by wet processing, and it would seem that here is a field worth developing. Satin types of silk fabric would most likely respond favorably to this line of treatment.

The pre-embossing of rayon crepe fabrics as now widely practiced relies on the plasticity of the rayon fibers. This process is applied to fabrics which may contain both viscose and acetate rayons and in this case the acetate rayon responds more than the viscose for it is easily the most plastic of all fibers. The theoretical considerations which underlie this pre-treatment of crepe fabrics for the purpose of regulating their final finished appearance are most interesting.

The crepe fabric itself is made up of say a highly twisted viscose crepe yarn in the warp, and a yarn of low twist in the weft. When such a fabric is placed in a boiling soap liquor, the viscose fibers swell about 40 per cent in cross section so that the twisted yarn tends to shorten on this account, and also the fibers tend to untwist. Actually, untwisting in the ordinary sense cannot take place because the ends of the warp yarns are not free. So untwisting takes place indirectly by the process of snarling. Generally it is desirable that the twist in the warp yarns shall be perfectly uniform throughout so that the snarling is uniform and a crepe fabric results which has an even uniform pebble appearance. If some parts of the yarn had more twist than other parts then there would be differences in the degree of snarling and therefore heavily and lightly creped parts in the fabric surface. It is easy to observe how this can come about by spotting the fabric (before crepeing) with strong latex or other adhesive. When this fabric is placed in a boiling soap liquor the fabric crepes only in the unspotted parts and an uneven appearance results. Pre-embossing aims at obscuring any such twist irregularities which may be, and which generally are, present.

The crepe fabric is led between a two-bowl calender, the upper steel bowl being engraved with a small all-over design and the lower bowl being of paper or cotton and relatively soft. A moderate temperature is used, say about 70° C., but it is necessary to use a high pressure and this must be carefully adjusted so as not to cut the weft or warp threads. In this manner, the twist yarns are intermittently and regularly deformed (flattened) all over the fabric surface and at each deformation the crepeing forces are modified. When the embossed fabric is entered into the boiling soap liquor, crepeing proceeds less vigorously at the embossed than the unembossed parts and thus the general pebble appearance is modified and made more uniform. But the whole essence of the treatment is that the

rayon is sufficiently plastic to retain the embossed impressions for a period longer than it takes to effect crepeing. Fortunately rayon has considerable plasticity and it is on this fact that successful embossing of crepe materials depends.

Acetate rayon fibers have pronounced plastic properties and it is for this reason that more finished effects produced by embossing can be obtained on this type of rayon than any other. Acetate rayon is so plastic that it fuses at about 200° C. If it is considered that cellulose acetate rayon is merely cotton made more plastic by acetylating it then this is an illustration of the manner in which textile treatments can be assisted by discovering means to increase the plastic properties of a fiber.

Perhaps the plastic properties of cellulose acetate rayon are more interesting because they can be markedly increased by treating the rayon with various reagents such as acetone, acetic acid, and even aniline as has been previously demonstrated. Trubenized finishes are based on plasticizing acetate rayon. In this case, fabrics containing a proportion of acetate rayon are treated with a mixture of acetone and methyl alcohol so that the fibers become more plastic, and then one or more thicknesses are pressed together at a suitable temperature. The plastic rayon is deformed and finally cements the layers of fabric together.

Acetate rayon can be made sufficiently plastic by heat alone to enable special finishing effects to be secured. In this case it is necessary to control the temperature very accurately. If this is too high, the rayon material acquires a harsh handle, and if too low then the plasticity is just insufficient to give a permanent effect.

It is possible to take advantage of the difference in plasticities of viscose and acetate rayons to produce some unique and pleasing effects. As previously noted, viscose rayon is less plastic than acetate rayon. The most suitable fabric for this purpose is one having a viscose rayon warp and an acetate rayon weft or vice versa. The two rayons should be dyed to different shades such as black and gold, or blue and brown, etc. Preferably the viscose yarn should be somewhat coarser than the acetate rayon; a coarse poplin weave is especially suitable.

This fabric should be wetted out by passage through a two-bowl padding mangle and the addition of a small amount of a wetting out agent is helpful. It is then led through a small two-bowl embossing calender in which the steel engraved bowl is heated to about 100° C. The design on the steel bowl should consist of short fine lines evenly spaced over the whole of its surface. Immediately afterwards the fabric must be led over a few drying cylinders and it is essential to avoid any appreciable stretching of the fabric in this process. As soon as the fabric is dry it is noticed that, according to the embossed design, the fabric has a shimmering two-color effect which is particularly pleasing. The writer has not succeeded in producing this result in any other manner.

The effect is due to the fact that while both viscose and acetate rayon fibers respond to the embossing, it is the acetate rayon which is more plastic and which is therefore more permanently affected. In the drying the viscose rayon recovers from its deformed state while the acetate rayon does not, and this alteration of structure produces the peculiar shimmer described above. If a fabric of exactly similar construction but consisting entirely of acetate rayon is subjected to the same treatment no such pleasing finish is obtained.

In reviewing the various methods by which use is made of the plasticity of textile fibers in the finishing of yarns and fabrics it will be seen, as indicated above, that temperature and moisture are practically the only factors used to increase the plasticity. It is suggested that this is a position which requires alteration. Research should be made into other possible means. The use of acids, alkalis, and other chemicals must be investigated. It is not suggested that these reagents should be applied in so large a concentration as to produce parchmentization but only to the extent that they increase the plasticity of the fibers and so make them more amenable to finishing processes. It is believed that much good would come of an investigation along these lines especially since there has been little investigation hitherto.

Washington News Letter

By WALDON FAWCETT

THE PROPRIETIES OF PROTECTION BY BOYCOTT

FOR realists who recognize the interdependability of color and design in the textile industries, the turn of the official fiscal year reveals a complex and challenging situation at Washington. It is not merely that another Congress has come and gone without enacting the long-awaited Federal law for copyright protection of original designs and color plans. Recurrent though it be, this failure was a disappointment because the dubious attempt at design certification advanced half way to its goal in the statute books.

More significant, because positive rather than negative in effect, and because pointed directly at the textile industry, is the current gesture by the Federal Trade Commission repressive of the principle of design protection by boycott and blacklist. It amounts to an arbitrary veto at the outset of perhaps the most promising alternative to the perennially-deferred Federal Registration of Design. Incidentally, by this action the trade body injects an unex-

pected boundary into the new-found ideal of self-government in business,—or self-regulation of competition. Most serious of all, the complaint against the Fashion Originators Guild envelops in uncertainty the whole concept of industry-by-industry protection of designs, which was generally regarded as the most promising substitute for broad Governmental authentication of designs.

That the Federal Trade Commission should so broadly call in question the properties of design security via punishment by ostracism is of moment, primarily, because it joins the issue of control of exclusive industrial property by concerted pressure. But the deepened emphasis derives from the gathering authority and widening jurisdiction of the Federal Trade Commission. First, in this pyramid of prestige came selection as successor to the NRA. Followed by the proposal in the U. S. House of Representatives to supplant the U. S. Food and Drug Administration by the Federal Trade Commission as the arbiter of advertising in the food, drug and cosmetic field. Illuminating, as a further measure of mounting influence was the much-discussed Patman Act which emerged as the sequel of the Trade Commission Investigation of Chain Stores. All leading to a presumption that the Trade Commission will find no denial short of the highest Federal courts of its ambition to withhold from the textile industry its home remedy for design piracy.

In the ultimate judicial appraisal, to which this controversial issue must inevitably come, there is a foreordained line of cleavage. Viz, the separation between conspiracy-in-restraint-of-trade, — the pet taboo of the Clayton Act and Federal Trade Commission Act,—and the inalienable right of a producer or seller to choose his own customers. By way of background, it should be regarded that the Trade Commission has been, all along, rabid in antagonism to combinations that were alleged to interfere with the free and natural flow of trade. This attitude has been conspicuous, for example, in the prolonged campaign of the trade body in suppression of fixing and enforcement of uniform resale prices on trademarked goods.

The Trade Commission, it might be added, has expressed disapproval of group-or majority-coercion in an industry not only incident to the exercise of the Federal police power in individual cases but, likewise in the conduct of Trade Practice Conferences, called to formulate codes of ethics for specific industries. By way of hypothetical contrast it might be cited that the Trade Commission has stood ready to discipline the individual trader who, for the purpose of passing off goods, makes a Chinese copy of a competitor's color plan expressed in product or container design. At the same time, the Commission has stood no less ready to champion the cause of any individual trader who has been subjected to any form of intrigue designed to compel him to waive his common right to a broad use of colors.

Symptomatic of the course likely to henceforth be pursued, is the complaint against Fashion Originators Guild of America and the affiliated organizations such as National Federation of Textiles, which latter was brought into case mainly because of the designation of its Industrial Design Registration Bureau as the agency for registration of the designs of fabrics sought to be safeguarded by the coalition. The basic charge against all parties to the defense is agreement, combination and conspiracy "to hinder and suppress competition" in the interstate sale and distribution of textile fabrics. But there is the further accusation that the effect of the criticized concert of action is to create a monopoly. This last indictment being based upon the claim that garment manufacturers are compelled, upon pain of fine, to confine the purchases of their requirements to members of the textile groups within the F.O.G.A. set-up.

By inference, the position of the Federal Trade Commission in respect to the rights of customer selection appears to be that the ordinary prerogatives of choice are transcended by systematic arrangements which include surveillance by scouting shoppers and the ultimate circulation of blacklists containing the names of non-cooperating dealers. Reading between the lines of the complaint, it appears evident that the Trade Commission feels that traditional liberty of action in forming and maintaining business relationships is dependent upon particular, individual application rather than simultaneous collective enforcement by a group directed against an entire section of a trade community. The Federal Trade Commission, in mustering evidence, makes much of the assertion that more than 400 dealers have been blacklisted by the F.O.G.A., and that more than 100 manufacturers have been equivalently stigmatized.

Substantially the doctrine preached by the Federal Trade Commission is that any artificial control of a market by boycott, blacklisting, etc., operates to restrict and curtail commodity consumption. In the case in point the premise is that the result of the offending combination and concert of action is to prevent and hinder manufacturers, converters, dyers, printers, etc., from selling their merchandise to garment manufacturers who, but for the existence of the agreements in question would purchase these products. And so on through the various levels of production and distribution.

As the law has it, however, the Federal Trade Commission is empowered to intervene in frustration of violence to competition only if and when the public interest is involved. Accordingly, we find the Trade Commission laying stress upon the charge that dictation of distribution based upon design monopoly operates to substantially increase the price of garments to the consuming public. The theory here invoked is that the measures of control complained of lessen the volume of goods entering the market, operate to "force many retail dealers to discontinue" lines, and prevent the maintenance of full stocks. The effect of all of which is, according to the Commission's analysis, reflected in price inflation at the several levels and is cumulative on plane of consumption.

The defense of the Fashion Originators Guild,—that is to say its response to the Federal Trade Commission—is in line with the position taken in U. S. District Courts and State Courts where the question of the proprieties of design control by this body have already been raised. Vigorous rebuttal is made to the charge of the Trade Commission that the Industrial Design Registration Bureau of the National Federation of Textiles is an instrument of compulsion. The Guild, in effect, takes the position that no basis for a charge of conspiracy or monopoly can stand upon a system of design enrollment for priority where the register is open and available to all textile manufacturers or merchants, and others.

An interesting contention of the Guild in respect to textile designs, as translated into ladies' garments, is that there is no perceptible demand for any single style or group of styles. That, on the contrary, the consumer's demand is only for fashion themes which any and all manufacturers can interpret. Specifically, the F.O.G.A. denies that it makes any demands upon non-member manufacturers and further denies that it places the names of non-cooperating manufacturers upon any blacklist or circulates such blacklist. Instead of conceding that design control by concert of action increases prices to consumers, the argument of the Guild is that excessive copying of designs makes it necessary for the consumer to pay higher prices than would otherwise be the case.

In its attempt at justification before the so-called "supreme court of business" the Fashion Originators Guild has been at some pains to develop the theory that all branches of the textile industry, and contributory equipment and supply interests, are affected by the market demoralization which is reputed to follow style piracy. In establishing the connection it is set forth that the imitations or reproductions produced by parasitic copying usually appear at lower prices. In order that the price may be made lower and lower, the qualities or dyes and other materials are alleged to be cheapened. In short, the logic is that the whole trend of competition is diverted toward the poorest and cheapest goods. Accompanied by high mortality or rapid obsolescence of fashion, if there is steady pounding upon a few designs.

Judge Brewer, in giving, in the U. S. District Court in Massachusetts, an opinion in the case brought against the Guild by Wm. Filene's Sons Company, found that none of the measures adopted by the Guild to effectuate its purpose involved any attempt to regulate price, or control production, or allocate business between its members or their customers. He found nothing to indicate that the administrative system of arbitration before the Impartial Committee on Style Piracy has worked arbitrarily or unfairly to cooperating retailers. Discussing the so-called coercive influences exerted the Court remarked: "It may be necessary in order to purify the flow of trade, to impose some restrains upon those who enter it, but when such restrictions are not arbitrary or unreasonable they cannot be regarded as the undue restraint of interstate commerce contemplated by the Act."

An important judicial contribution to a build-up that is gradually formulating a composite, authoritative pronouncement on the proprieties of cooperative design control was made by the New York Supreme Court in the case of Wolfenstein vs. Fashion Originators Guild. In that case it was found that the operations of the Guild did not constitute a violation of the New York State anti-trust law, known as the Donnelly Act. The Court in that instance pointed out that the members of an association had the right to cooperate for the purpose of correcting abuses or to stabilize an industry provided their endeavors did not amount to an unlawful boycott or constitute an unreasonable restraint of trade. And nothing arbitrary or unreasonable was found in the arrangement which prohibited sales by members of the Guild to dealers who engaged in practices which were inimical to the trade.

By way of establishing the ethical and legal proprieties of the F.O.G.A. system for enforcing mutual respect for priorities and creative privileges in design, stress is being laid upon the absence of the ordinary accompaniments of business conspiracy. For example, the Guild, answering the charge of the Trade Commission that it employs shoppers to spy upon retail dealers, insists that its shoppers are openly known to all stores and act merely in a reportorial capacity. Furthermore the Guild has told the Trade Commission that it is prepared to produce evidence that the scouting shoppers do not adjudge whether or not any garments are copies and do not have any right of decision on this point, such right being specifically vested in the Style Piracy Committee. Incidentally, the defendant before the Trade Commission seeks realization by this umpire that the Style Registration Bureau exercises no power of decision as to whether or not a particular dress is a copy, that right being, as above noted, reserved to the Impartial Committee on Style Piracy.

The attempt at disciplinary action by the Federal Trade Commission coupled with lapse in Congress of the Duffy Copyright Bill carrying the Vandenberg Amendment is calculated to make the design protective proposition something of an issue, for certain constituencies, in the Congressional elections. One effect of the latest intervention may well be to increase the pressure at Washington for a special law creating a Federal system of design registration or design copyright. Remembering, however, the successive disappointments in the perennial effort for the last-mentioned objective, one school of thought holds that the indicated course at this juncture is to seek legislation which would clearly and specifically exempt from the operation of the anti-trust laws groups that seek to suppress design piracy by refusal to maintain trade relations with non-conformists. This latter course has the more converts by reason of the movement in Congress to expand the jurisdiction of the Federal Trade Commission to cover all phases of unfairness in commerce instead of solely unfair practices in competition.

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists
JULY 27, 1936

Officers of the Association

WILLIAM H. CADY, *President*
U. S. Finishing Co., Providence, R. I.

A. R. THOMPSON, Jr.—ELMER C. BERTOLET, *Vice-Presidents*

WILLIAM R. MOORHOUSE, *Treasurer*
National Aniline & Chemical Co., Boston, Mass.

HAROLD C. CHAPIN, *Secretary*
Lowell Textile Institute, Lowell, Mass.

LOUIS A. OLNEY
President Emeritus and Chairman of the Research Committee
Lowell Textile Institute, Lowell, Mass.

Councilors-at-Large

JOSEPH F. X. HAROLD — HAROLD M. CHASE
DONALD H. POWERS — ARTHUR E. HIRST
CARL Z. DRAVES — HENRY F. HERRMANN

Councilors Representing Sections

BEN VERITY (Rhode Island) — R. M. RITTER (Philadelphia)
HANS MEYER (New York) — ELMER F. SMITH (Midwest)
ROLAND E. DERBY (N. New England) — R. S. WHEELER (South Central)
CHARLES B. ORDWAY (South Eastern) — CHARLES H. STONE (Piedmont)

Local Sections and Their Officers

Northern New England Section
Carl Z. Draves, Chairman, Ludlow Mfg. Associates, Ludlow, Mass.
John N. Dalton, Secretary, Pacific Mills, Worsted Division, Lawrence, Mass.

Rhode Island Section
John G. Masson, Chairman, Rosemont Mill, Woonsocket, R. I.
Raymond A. Pingree, Secretary, 7 Sayles Ave., Saylesville, R. I.

New York Section
George L. Baxter, Chairman, Bradford Dyeing Association, 40 Worth St., New York, N. Y.
P. J. Kennedy, Secretary, E. I. duPont de Nemours & Co., Inc. 61 Thomas St., New York, N. Y.

Philadelphia Section
Herbert S. Travis, Chairman, Rohm & Haas Co., Inc., 222 West Washington Square, Philadelphia, Pa.
R. W. Delaney, Secretary, National Aniline & Chemical Co., 200 S. Front St., Philadelphia, Pa.

Piedmont Section
Chester L. Eddy, Chairman, Renfrew Bleachery, Traveler's Rest, S. C.
Raphael E. Rupp, Secretary, Pacific Mills, Lyman, S. C.

South Central Section
Walter E. Hadley, Chairman, Standard Coosa Thatcher Co., Chattanooga, Tenn.
Murray B. Smith, Secretary, Standard Coosa Thatcher Co., Chattanooga, Tenn.

Midwest Section
Arthur T. Brainerd, Chairman, Ciba Co., 325 W. Huron St., Chicago, Ill.
Elias A. Johnson, Secretary, National Aniline & Chemical Co., 357 W. Erie St., Chicago, Ill.

South-Eastern Section
C. A. Jones, Chairman, Georgia School of Technology, Atlanta, Ga.
Robert H. Harris, Secretary, Spalding Knitting Mills, Griffin, Ga.

Lowell Textile Institute Student Section
Herbert A. Wormwood, Chairman; Henry S. Anthony, Secretary

North Carolina State College Student Section
A. E. Shumate, Chairman; J. W. Furr, Secretary

Members should notify the **Secretary** immediately of all address changes

Standard Wash Fastness Samples

Cotton, Wool, Silk

The standard samples which have been in preparation for some time by the Sub-Committees on Fastness to Washing of Dyed Cotton and Dyed wool are now ready for distribution, and the original standard silk sample cards have been revised to correspond with the new system of classification first introduced in the 1934 Year Book.

These standards have all been carefully dyed with the dyestuffs and according to the dyeing methods recommended in the 1934 Year Book and each set includes a dyeing representing each of the different classes of fastness.

With these sample dyeings for reference it will be possible to accurately grade the fastness to washing of any dyed cotton, wool, or silk fabrics, by comparing them with the standards after subjection to the standard washing tests as approved by the Association.

The A.A.T.C.C. is now prepared to furnish these three sets of washing standards for $3.00 or $1.00 per individual set which is to cover the cost of preparation.

All inquiries concerning these washing standards should be addressed to the Chairman of the Research Committee.

LOUIS A. OLNEY,
LOWELL TEXTILE INSTITUTE,
LOWELL, MASSACHUSETTS.

The Chemist as an Aid in the

Detection of Crime*

By WILLIAM D. McNALLY, M.D.

THE deleterious qualities of poisons and the effects of bites of venomous vipers were probably known to prehistoric man. The most ancient writings indicate a knowledge of poisons in the early civilizations of Egypt and India. The crime of secret poisoning was known to the ancient Greeks and Romans and before them to the people of the far east.

Vegetable poisons extracted from plants were used more than mineral poisons by the ancient poisoners. Bichloride of mercury was known to the Arabian and Greek alchemists of the eleventh century. During the latter part of the seventeenth and the early part of the eighteenth centuries the use of poison as an agent of secret murder became very common in Italy and France. La Spara in 1659 gave poisons to young women who wished to get rid of their husbands. At a later period Toffana carried on a similar traffic at Naples. She poisoned nearly 600 people. The poison used by these women was arsenic. In France at the same time was the noted poisoner, the Marchioness of Brinvilliers, who poisoned her father and two brothers. She confessed the crime and was executed in 1676.

Women have figured prominently in the cold blooded, calculating cruelty and the wholesale character of their crimes.

Previous to the nineteenth century the methods for the detection of poisoning depended, as far as they were of any value, upon the circumstances attending the administration. Apart from these, they were mere superstitions, modified only to a slight extent even as late as the middle of the eighteenth century by the more extended knowledge of postmortem appearances in the cadaver caused by disease.

The development of methods of medico-legal recognition of poisoning to the point which they have reached at the present time, and which we believe to be far short of what they will be in the future, has followed advances of those sciences upon which they mainly depend—chemistry and pathology. Of the two forms of postmortem investigation of poisoning, toxicological chemistry was the first to acquire foundation, as chemistry in its simpler branches was a well developed science half a century before the dawn of modern pathology. As the chemistry of the inorganic kingdom preceded organic, the detection of mineral poisons became possible at an early date, while chemical proof of the presence of at least some of the vegetable and organic poisons is even at the present unattainable by means now at our disposal.

In the last few years the ultra-violet, the X-ray and the spectrographic methods have added a great deal to our knowledge of the presence of many substances that could not be detected by purely chemical means. The coroner's physician, after he has made a postmortem, is many times unable to give the cause of death without having first a chemical examination of the organs. So the chemist is given material from the autopsy to eliminate poison as a cause of death, for in many cases of poisoning the postmortem fails to show a characteristic appearance and it is only after chemical examination that poisoning could be excluded as a factor in causing the death of the individual. A careful history taken by a deputy coroner will often give the chemist a clue as to what to look for. On one occasion the pathologist was unable to determine the cause of death and submitted the organs to me for examination. The deputy coroner obtained a history that a man took a capsule at three o'clock and another one at six o'clock and died an hour after taking the second capsule; and this deputy coroner was able to give the man's symptoms before he died. The symptoms meant to me two certain drugs. Having the box with the capsules in, I called up the druggist and asked him what the prescription was. He gave me the ingredients as containing 1 grain of aconitine with a half a dozen other drugs. When I called his attention to the fact that he had a fatal does in each capsule, he was greatly alarmed for he had failed to note this when he filled the prescription. The physician also claimed that he could give that much and was going to bring in authorities by the following morning. Instead he came in and acknowledged his mistake. The average dose for aconitine is 1/400 grain, and each one of these capsules contained ten times that dose.

The newspapers frequently mention the name of Caesar Borgia in connection with poisoning. This man lived during the latter part of the fifteenth century and is credited with poisoning of only seven people. We have had instances of individuals causing more deaths than Borgia in Chicago.

*Presented at meeting, Mid-West Section, May 2, 1936.

In the history of toxicological chemistry, three events may be cited as marking important changes in the development of the science:

1. Practical application of the Marsh test in 1836 by which means we are able to detect very minute quantities of arsenic. This test is still a standard one for arsenic. However, shorter tests have been introduced, such as the Reinsch and Gutzeit tests.

2. The introduction of the Fresenius Van Babo method of digesting organs for mineral poisons.

3. The separation of the vegetable alkaloids. Since that time there has been great refinement in the methods of detecting poisons in these three groups.

The proof in a trial for murder by poison is divisible into three parts:

1. The deceased died from the effects of poison.

2. Said poison was administered to the deceased by the defendant.

3. Said poison administration was with a deliberate and premeditated design.

There are three motives for poisoning: First, love and passion; second, hatred, and third, greed.

In a case investigated a man died after three days' illness. A doctor gave the cause for death as "sarcoma of the pylorus." The sister of the deceased came into the coroner's office and asked to have the body exhumed, as she feared foul play. A chemical examination of the organs showed the death was due to arsenical posioning. The symptoms described by all four of the doctors attending the man were those of arsenical poisoning. Upon investigation it was found that the wife was very friendly with a former boarder who, at the death of the husband, again became a boarder. The wife, when informed by the detective that her husband died of arsenical poisoning, said her husband drank the liquid from a dish of fly paper poison. At the time of her husband's illness she did not impart this information to the doctors called into the case. Love here was the motive.

Of all the poison cases of recent years there has been none that has attracted more attention than the Orpet case. Motive paralleled motive, action paralleled action, opportunity paralleled opportunity. The case had many points in favor of suicide and many points in favor of murder. The instrument of death could have been the same in each case. Orpet, having become infatuated with another girl, could have had love and passion as his motive. Each had access to cyanide, but the evidence indicated that Orpet had access to only sodium cyanide. Laying aside Orpet's own compromising conduct, the guilt or innocence of the defendant rested entirely upon the chemical evidence introduced. An analysis of the stomach contents showed that death was due to potassium cyanide. Samples of cyanide in the Orpet greenhouse, analysis showed to be sodium cyanide. Several months after the finding of Marion Lambert's body in Helm's woods, the coat was submitted to a chemist. On June 13th I was asked to examine the coat and other wearing apparel. Upon the coat, about fifteen inches from the collar, four inches from the button hole, were three spots about one-half inch in diameter and one-quarter of an inch apart in a straight line. Only a miracle could have arranged the spots in this order. In the examination of hundreds of blood stains and other spots found on clothing I have never observed a parallel case. I noticed an odor of cyanide while examining the spots, calling the attention of the state's expert to this fact. The importance of this observation was not realized until a week or ten days later. Experiments on clothing and chemical glassware having failed to duplicate the spots from solid potassium or sodium cyanide, the inference was that if the spots were ligitimate they were made by a liquid, to which fact I testified. Further experiments also developed the fact that solutions of cyanide, when deposited on clothing and glassware, lose the characteristic odor of cyanide. Experimenting with solutions of sodium and potassium cyanide, I was unable to duplicate the spots found on the coat, as liquid cyanide rolled off from the fabric like a drop of mercury. The above facts were communicated to the State's Attorney of Lake County and he was told that the same information would be given to the attorneys for the defense. The defense immediately claimed the spots were planted. If the coat had been photographed when first found, how easly the contention of the "plant" could have been eliminated. The spots on the coat after the acquittal of Orpet were examined by two chemists for the *Evening American* and found to be sodium cyanide, an entirely different substance than found in the stomach. Great stress was laid upon the chemical examination by the defense and I believe was the main point upon which the jury acquitted Orpet.

In 1910 Dr. Crippen, an American dentist living in England, murdered his wife, Belle Elmore, with hyoscine hydrobromide. Crippen was infatuated with his stenographer. He sailed from England with his stenographer disguised as a boy shortly after the authorities began searching for his wife. The body was found buried in a basement. The body was covered with lime to assist in decomposition. A wireless was sent out to boats bound for America, and a clever captain detected Crippen and the stenographer. When the boat landed at a Canadian port, Crippen was promptly arrested, returned to England, found guilty and executed. This was the first case where the wireless was used to catch a criminal.

The Tillie Klimek case was one of special interest to me as the detection of this famous poisoning case came directly from a diagnosis which I had made. Special study of alcoholism had been made and the deaths in Cook County due to alcoholism tabulated. A west side physician had a peculiar case of alcoholism and wanted me to see the patient. After an examination I gave my

opinion that the man was suffering from arsenical poisoning. An examination of the excretions gave positive proof of arsenic. Investigation then revealed that several husbands died under suspicious circumstances. Mrs. Klimek was arrested and, after questioning, said she had given her husband a powder given to her by a cousin. Twelve of the bodies exhumed gave evidence of arsenical poisoning. In two of the cases Tillie told her husbands that they were going to die, ordered her mourning wardrobe and brought them in to show the husbands how she was going to be attired. Mrs. Klimek was given a life sentence, her cousin was acquitted.

In the Peter LaLonde case, Sioux St. Marie, Michigan, January, 1914, the expert testimony was the main factor in obtaining the maximum sentence of life imprisonment. A groceryman had been shot with a shot gun while taking pork out of a pork barrel. His money, amounting to several hundred dollars, was missing. Many suspects were picked up by the police. Suspicion pointed to a half breed Indian, LaLonde, who was spending money very freely. He said he had obtained the money from selling an interest in a mine. Investigation found this to be false. A few paper-bills in his possession had stains of blood. His clothing had numerous drops of blood spattered upon it. The suspect said the stains were due to blood from fish which he had been cleaning. The two-dollar bill, clothing, shoes and shot gun were submitted to me for examination. The stains were found to be due to blood of human origin. Conviction followed.

After Loeb and Leopold were arrested, I examined the clothing, boots and the automobile in which they carried Bobby Franks to his place of concealment, the forest preserve. It was here that a pair of glasses was found which, by clever detective work, was traced to one of the boys. Upon the clothing and the automobile I found evidence of blood of human origin. Upon the chisel which they had wound with tape and hit the boy on the head, I found also stains of blood of human origin. This chisel was thrown from the car in which they were carrying the boy and somebody picked it up, and it was found to have been previously purchased at a hardware store by one of the boys.

The most interesting case along this connection is a case that happened just a few months ago in Rockford, Illinois. A boy was walking on the highway a few feet away from the pavement when a red car came along, jumped the curb and hit the child. The car kept on its way. The police began looking for the car and found that it belonged to a salesman of a certain company. The broken handle was found to have come from the left car door. Attempts had been made to wipe off the blood on the car but they had failed utterly to remove the stains from the grooved surface on the inside of the handle. On examination, it was found to be blood of human origin and came from a person with Group II blood. We requested the boy and his father to come to my office for blood examination and it was found that they both belonged to Group II. The serum of Group II agglutinates the corpuscles of Group III.

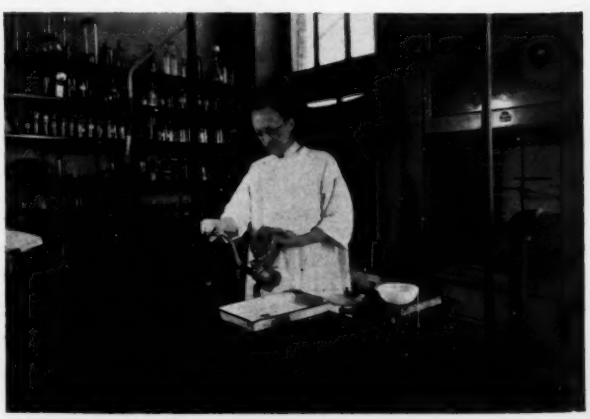
It is impossible to tell the exact age of the blood stain, as a great many factors enter into the drying of the blood. Human blood may be detected on clothing and weapons after a period of thirty years.

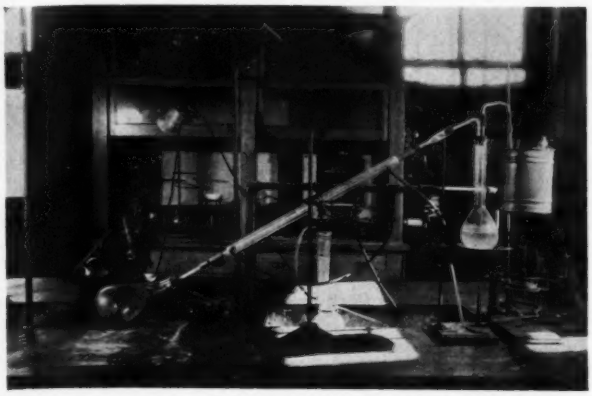
By the precipitin test used in the above blood tests, we are able to show that the blood serum of man is closely related to the blood sera of apes, the steps of relationship from man backwards being definitely traceable. This we dislike to admit, but the Darwinian theory that our ancestors belonged to the higher apes is greatly strengthened by the precipitin reaction in showing blood relationship. Zoologists today agree in placing men and apes in one order, the anthropoides.

Most of the cases of death that I have investigated while toxicologist for the Coroner's Office of Cook County, were cases where there was a suspicion of foul play or where the Coroner's physician was unable to determine the cause of death.

The first step in the investigation of poisons, after the organs are received by the toxicologist is to weigh each organ separately, note the color, the odor and take a small piece out of each organ for a mircroscopical examination. The entire organ is then ground up in a meat grinder, in a way similar to that which the housewife uses to grind meat for hamburger or meatloaf. In photograph No. 1, my assistant is about to grind up a stomach that we are investigating for the presence of poison. After the organs are finely comminuted, an aliquot part is taken for the detection of volatile poisons, such as grain alcohol, wood alcohol, chloroform, acetone, cyanides, carbolic acid, etc. The sample of the tissue is placed in a Kjeldahl flask which is connected to a copper generator and also to a Liebig condenser, the adapter dipping into 15 cc. distilled water contained a 300 cc. Erlenmeyer flask. Water and tartaric acid are added to the Kjeldahl flask and steam is generated

Photograph No. 1—Grinding Organs for Chemical Examination.



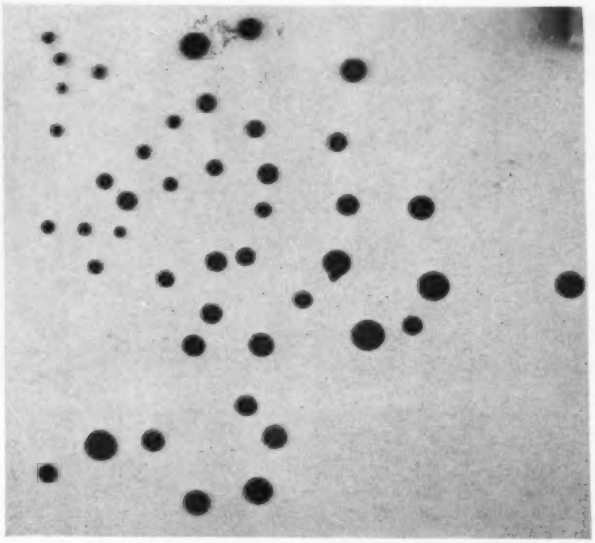


Photograph No. 2—Volatile Distillation Apparatus.

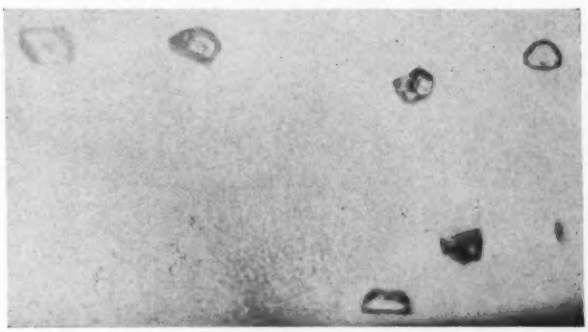
in the copper boiler. This apparatus is shown in photograph No. 2. After a steam distillation for volatile substances coming over in an acid solution, the tissue in the Kjeldahl flask is made alkaline with magnesium oxide and the distillation continued as before, changing the Erlenmeyer flask which will now contain chloroform which might have been derived from chloral hydrate, nicotine, conine, and aniline, occurring as such in the tissue, or from compounds that would be broken up in an alkaline solution. Appropriate tests are applied for these various substances occurring in the acid and alkaline distillates. To 25 grams of tissue add 25 cc. hydrochloric acid, 25 cc. of water, and a small strip of copper foil. The copper foil and acid having been previously tested for the presence of arsenic and mercury. In the presence of arsenic, bismuth, antimony, and sulfides, a black deposit will be formed on the copper foil. In the presence of mercury the foil will be silvered. The foil is removed from the casserole, washed with water, alcohol and ether and put in the McNally subliming tube which is shown in photograph No. 3. This is nothing more than a piece of glass tubing drawn

Photograph No. 3—McNally Tube for Reinsch Test.

out so there is a constricted area of about 1½ inches with a longer arm of 3 inches, and the short arm of the tube about 1½ inches, and the constricted area is refrigerated by a piece of filter paper which has been dipped in cold water. The copper foil is placed in the long arm of the tube. Heat is applied under the copper foil, with the thumb over the opening in the long end. Any arsenic, mercury, antimony and bismuth will be deposited underneath the refrigerated area. If considerable arsenic and mercury is present, the arsenic may be found beyond the constricted area. This is a very rapid test for the detection of arsenic and mercury which can be seen under the microscope, the mercury as small shiny globules, as in photograph No. 4. It is possible by this modification to



Photograph No. 4—Mercury Seen in McNally Tube in Reinsch Test.

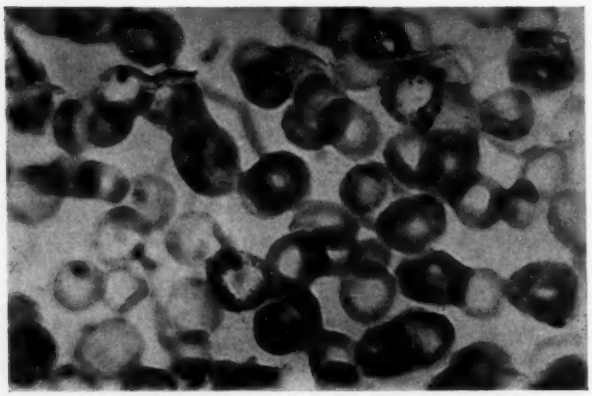


Photograph No. 5—Arsenic Crystals Seen in McNally Tube in Reinsch Test.

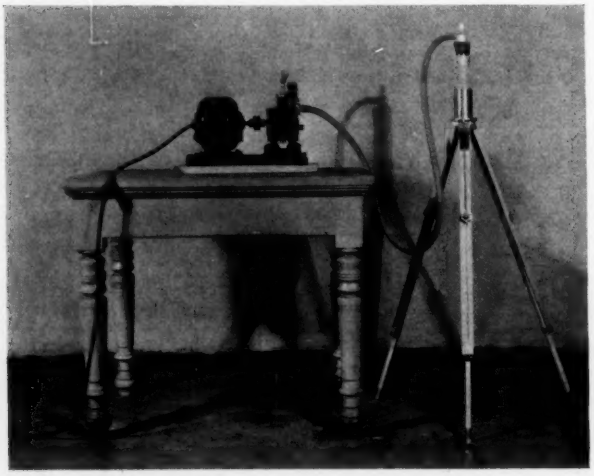
show the presence of 1/500,000 of a grain of mercury. In photograph No. 5 arsenic trioxide will be seen as octahedral crystals.

Since 1929 many damage suits have been filed for lead poisoning and silicosis. Many of these cases had no foundation for a suit. A racket was developed by a certain group of lawyers and doctors. All that was necessary was to show that a man had worked in a dusty atmosphere, not knowing whether this air contained lead or silicon dioxide.

For the detection of lead in the acute stage a smear of blood is made which shows basophilic stippling. An excellent example of this is shown in photograph No. 6 where several of the red cells show numerous punctate markings, which give it the name of a stippled cell. This is shown in cases of chronic lead poisoning only to a small extent and it is necessary for us to resort to a chemical examination of the urine and stool and to show that lead is being excreted. If we find over 0.07 of a mgm. of lead per 1000 cc. of urine we know that the man is absorbing and excreting lead.



Photograph No. 6—Red cells in an Acute Case of Lead Poisoning Showing Basophilic Stippling.



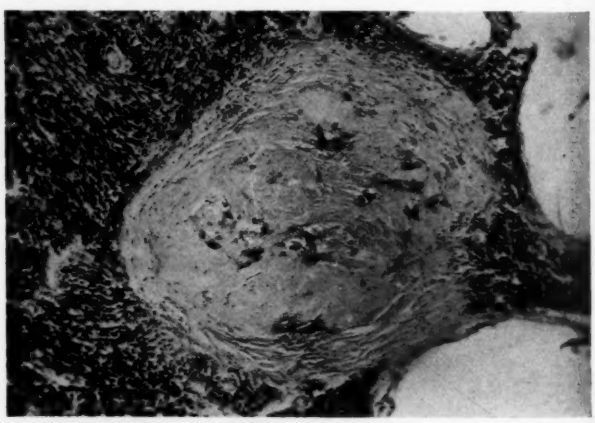
Photograph No. 7—Dust Collecting Apparatus.

In every case where lead, silica or fumes are suspected, as a cause of illness, we use an apparatus called the Impinger Dust Sampler, which collects the dust in water or the fumes in a suitable solvent. In photograph No. 7 is a picture of this apparatus showing the electrically driven suction apparatus, and the impinger flask for the collection of the dust. This same type of apparatus was used in the Almore Dye case for the collection of impurities in the air.

In the Almore case your secretary, Mr. Johnson, brought in a man who had shovelled dyes for over 20 years, inhaling and coming in contact with dyes and concentrations many hundred times stronger than that encountered by any other man mixing dyes in a smaller establishment where dyeing is done, yet had not suffered any ill effects.

Cases of poisoning come from benzene, nitro-benzene and aniline, which are used as a basis for many dyes. Most of the cases of aniline and nitro-benzene poisoning come from their use in preparing shoes to be dyed or from the removal of a dye already present in the leather. Shoes are worn before the aniline or nitro-benzene has disappeared, it is absorbed by the skin and causes serious cases of poisoning. Most of the cases of poisoning with which I have come in contact were not from the handling of aniline dyes but from derivatives of aniline used in medicine. The handling of aniline in industry can cause acute or chronic cases of poisoning. Cases of poisoning have occurred in the manufacture of aniline dyes during the process of sulfonation, nitration, caustic fusion reduction and in other processes used in the manufacture of dyes. A great amount of evidence can be produced to show that the finished colors are harmless, an example being the witness we had brought in the Almore Dye case who had shovelled several hundred pounds of various dyes every day for many years without ill effects. This is not true, however, of the crude and intermediate products encountered in the manufacture of the dyes. Phenylene-diamine and toluylene-diamine can produce asthma-like attacks especially in hypersensitive workers. These two substances are used in the fur-dyeing industry, and poisoning by them is due to the face that quinone-diamine is produced on the hands of the workmen engaged in dyeing furs, as an intermediate in the oxidation of the p-phenylene-diamine by hydrogen peroxide.

It is impossible in the time allotted for this lecture to discuss the various substances used or developed during the process of dyeing other than the dyestuffs themselves.



Photograph No. 8—Section of a Lung from a Case of Silicosis.

Photograph No. 8 shows a section of a lung in a case of silicosis. While this photograph has no bearing upon the detection of crime, it is of interest to show how silicosis can be detected by the microscope if we have a properly prepared section of the lung. A chemical examination of the lung will also determine whether a man had silicosis, and the toxicologist or biochemist is frequently called upon to make such an examination. Twenty grams of a well dried lung is ashed in a platinum crucible, and the amount of silicon dioxide is determined. From an examination of over 100 lungs I arrived at the normal figure of 1.13 mg. of silicon dioxide per gram of dried lung. Silicon dioxide is found in all tissues of the body, including the

hair, nails, bone and soft structure. The subject of silicosis is very broad and no attempt will be made at this time to discuss the same, but simply to mention the fact that most of the cases I have investigated belonged to the racket class. It will be of interest for you to keep this in mind as there is no telling when you, as dyers, will be confronted with the problem involving alleged cases of diseases, caused by inhaling dust.

Hydrosulfite and Vat*

An Analytical Demonstration

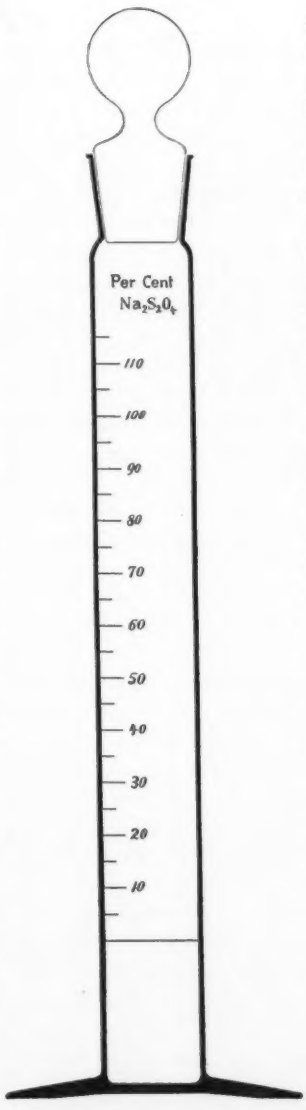
By R. FEIBELMANN†

NO DOUBT many of you gentlemen know that my demonstration will cover what has already been published in American literature. Some of you may even have used the apparatus which I am privileged to show you. However, I have found that it is almost unknown here, although it would be of considerable value in the dyehouse or laboratory. I sincerely hope that my demonstration of these simple methods for the determination of hydrosulfite in substance and in the vat, may be of assistance to you.

I need not emphasize the importance of sodium hydrosulfite as a reducing agent. You know it is the most important agent for the reducing of vat dyestuffs, as it acts both quickly and simply. This is explained by its very unsaturated character; it is so hungry for oxygen that it picks it up from wherever it can get it; from dyestuffs or other reduceable chemicals or materials; from the water in which oxygen is dissolved, or from the air, and this is the great difficulty.

Sodium hydrosulfite is not stable; unless great care is exercised in storing and it is protected against humidity and air, it loses a large part of its reducing value. The dyehouse is not a scientific laboratory; the men working there are not always acquainted with the chemical properties of the ingredients they are handling; hence the hydrosulfite is often exposed to conditions which are unfavorable. It is absolutely necessary, therefore, to check the quality of the hydrosulfite at regular intervals, and to consider the loss of its reducing value when used in the formula. For instance, if a man weighs out 5 pounds of hydrosulfite, he may have only 3 pounds of the actual substance. Obviously something will go wrong.

But how to check the sodium hydrosulfite? Several methods are described in books, but none will be simple enough to be performed in the dyehouse by a man not scientifically trained. It follows, therefore, that the hydrosulfite is seldom checked, and its quality which is supposed to be okay is probably only 60 or 70 per cent.



Hydrosulfometer

With the simple apparatus which I have called the Hydrosulfometer, the untrained man can check the hydrosulfite very easily and reliably. It is a measuring cylinder, the scale of which indicates immediately the percentage of the purity of the sodium hydrosulfite, or its actual reducing value without any computation. One gram of hydrosulfite is put in the cylinder and water is added to exactly the zero line of the scale. Then add the dark red measuring solution slowly. When the discoloration no longer takes place and the red remains, the operation is finished. The level of the fluid indicates the percentage of purity of this sodium hydrosulfite. Shake cautiously in order to avoid faults by air oxidation. (Demonstration.) In this case, the sodium hydrosulfite has a reducing value of only 65 per cent. I repeat it with another one. This shows a value of 92 per cent purity.

The Hydrosulfometer is suitable not only to determine the value of sodium hydrosulfite, but may be used for all other combinations of hydrosulfite or sulfoxylate, e.g., the formal-

*Presented at meeting, New York Section, May 22, 1936.
†Aktivin Corp.

dehyde sulfoxylate. You can see that the scale of the Hydrosulfometer has a range up to 115 per cent. Can the reducing value of a compound of hydrosulfite be greater than 100 per cent? Yes, in comparison with sodium hydrosulfite of 100 per cent purity.

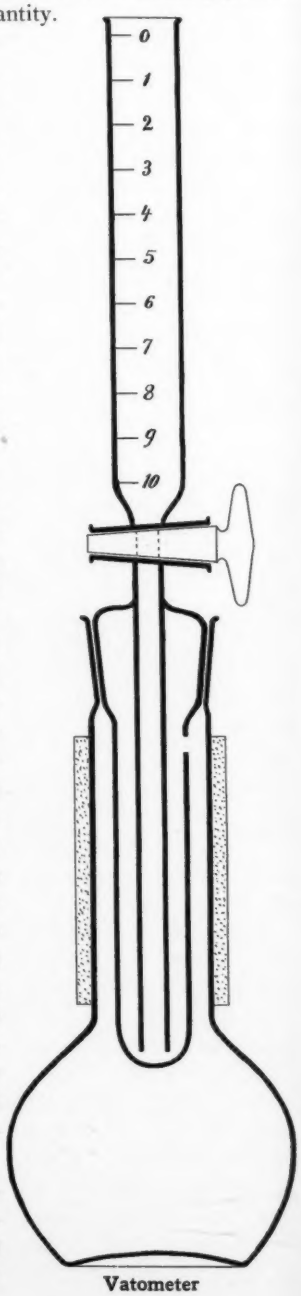
You know that a hydrosulfurous acid of the formula $H_2S_2O_4$ does not really exist. The salt sodium hydrosulfite $Na_2S_2O_4$ is to be understood as an anhydride between sodium bisulfite, $NaHSO_3$, and sodium sulfoxylate, $NaHSO_2$. If you add these two formulas to $Na_2H_2S_2O_5$ and deduct the elements of water, you get the formula $Na_2S_2O_4$, the formula for our sodium hydrosulfite. You also know that sodium sulfite or bisulfite has not the strong reducing effect of sodium hydrosulfite; you cannot prepare a vat with sodium bisulfite, although it is a good reducing and bleaching agent for certain other purposes, e.g., for wool bleaching. Its mild reducing power acts too slowly to be a competitor of hydrosulfite. Therefore, it is clear that only about half of the molecule is the real reducing agent in the vat. We do not consider this fact in the valuation of sodium hydrosulfite and label it as 100 per cent pure, if its vat reducing value corresponds to the formula $Na_2S_2O_4$. This has the molecular weight of 174, but of which, as already mentioned, only a part, namely, the sodium sulfoxylate of the molecular weight 88, is the real reducing agent. Therefore, 86 parts of the molecule sodium hydrosulfite are dead material. If we decrease the dead material, the percentage of the reducing part will be increased. And this is so with formaldehyde sulfoxylate $NaHSO_2$-CH_2O-$2H_2O$, in which the sodium bisulfite is replaced by formaldehyde. Although the formaldehyde compound contains 2 molecules of crystal water, its molecular weight is only 154, and contains only 66 parts of dead material. The proportion of actual or available sodium sulfoxylate in the sodium hydrosulfite and in the formaldehyde sulfoxylate is 100 to 113. Therefore, the reducing value of formaldehyde sulfoxylate, determined with the Hydrosulfometer, is 113 and therefore, the scale is continued to 115 per cent.

Of course, formaldehyde sulfoxylate is more stable than sodium hydrosulfite, and the checking of its reducing value is not so important.

But what of the determination of the hydrosulfite content of the vat? Any titration of the vat is impossible and also the titration in the Hydrosulfometer, as the color of the vat over-colors the indicator or the measuring solution. Dr. Lauterbach describes a very complicated method in the German literature in 1929. I will not explain this method, but will tell you of the ingredients which are needed: zinc sulfate, ammonium carbonate, sodium bicarbonate, titan chloride, formaldehyde, salicylic acid, acetic acid, and methylene blue; the operations are heating, filtering and titrating. I doubt if any man besides the inventor himself, has ever used this method.

Perhaps you think it is not necessary to determine the reducing value of a vat. Usually it is not in common vat dyeing—the vat being prepared with a certain amount of sodium hydrosulfite—a checked one, and the vat is exhausted by one dyeing. But if a continuous vat is used, you should know the actual content of hydrosulfite or its reducing value before you refresh the vat, as you do with a continuous bleaching bath. The checking with an indanthrene yellow paper or the observation of the oxidation on a glass plate are coarse methods—they tell almost nothing; they indicate only the fact that there is a reducing power, but tell nothing about the quantity.

Now with this small apparatus which is called a Vatometer, the checking of the vat is very simple and exact. It is so simple that the Vatometer is almost a toy, and it is really a pleasure to determine the reducing value of a vat. I say the reducing value, not the hydrosulfite content, although in this case it is quite the same. What we determine in the vat is really not the amount of hydrosulfite present, but the amount of hydrosulfite applied. The hydrosulfite, as such, is lost in the vat; its reducing power has been transferred to the dyestuff which is now the reducing agent. But in the main, it is the same. Practically nothing of the reducing power of the applied hydrosulfite has, or should have been lost in this process, provided that the conditions are normal. Only the necessary small surplus of hydrosulfite is unchanged. The Vatometer determines the transferred and the surplus of hydrosulfite together. Of course, only this total figure is important. I mention this only to be quite exact when I use the expression "reducing value."



Vatometer

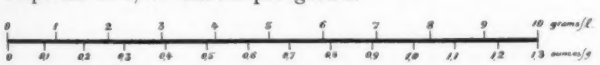
Now for the method itself. It measures the volume of oxygen which 10 cc. of the vat will absorb by

reoxidizing to the original dyestuff. As we measure a gas we do not need any titrating solution but only water.

The apparatus as you can see on the sketch, consists of two parts: a flask and a tube, with a cock which has a small tube fused with a receptacle in ampul form. This receptacle has a small hole which is widened at its upper end in order to form the ground stopper for the flask. If we put 10 cc. of a vat into the flask and fill the scaled tube with water, leaving the cock open, the air in the flask will be under the pressure of the water column, the level of which is at 0 point on the scale. The figures 0 to 10 mean grams of sodium hydrosulfite per liter. It is not practical for use in America, to give the values in liters, and it is advisable to make a scale on which the grams per liter are transformed into ounces per gallon, as indicated here.

The sample taken from the vat should, of course, have been previously cooled to room temperature; if necessary, this can be done by keeping the pipette under running water. You then add some drops of a foaming agent. The neck of the flask is to be covered with a thick layer of cork in order to protect the air in the flask against warming by the hand; then close the cock and shake the apparatus thoroughly. The vat will be quickly oxidized in the foam, and consume a certain amount of air which will produce a vacuum. As the water in the tube was lost in the shaking, fill again to point 0, and then open the cock. The water level sinks to a given point, and this point indicates the number of grams of sodium hydrosulfite per liter which were used for the vat, or in other words, its actual reducing value.

In my next demonstration on the use of the Vatometer, I shall not use a ready made vat, but produce it in the flask, giving in it an alkaline suspension of a vat dyestuff, and adding a little sodium hydrosulfite and a foaming solution. The entire procedure does not take longer than a minute. The scale shows 4½ grams per liter—this corresponds to 6/10 ounces per gallon.



I thank you, gentlemen, for your attention.

DISCUSSION

Chairman Baxter: Gentlemen, I am sure we have all appreciated Dr. Feibelmann's talk and that some of you have interesting questions you would like to ask of him.

Mr. Dogin: Dr. Feibelmann, do you take into consideration the pressure and temperature in the ultimate result of the Vatometer? For instance, would it make any difference in your final result if you were doing it in the summer or winter?

Dr. Feibelmann: Yes. One must think of that, because it is the measurement of a gas volume, and when I constructed this apparatus I was particularly wary on that point: whether there would be too great differences in different pressures of air or in different temperatures. But that is not the case, fortunately. The amount of air, measured in this case, is a very small one. One degree centigrade raises the volume of gas a two hundred and seventy-third part. The differences of temperature in the dyehouse or laboratory in winter and summer may be granted about 20 degrees Fahrenheit or about 10 degrees Centigrade. If you figure 10 times 1/273, that is 1/27th of about 3 cc., the average reducing value of a vat, you have such a small correction that it need not be considered. We must always be conscious of the fact that our apparatus is a technical device. Nevertheless the results are very accurate.

Mr. Schmeidler: Following up that same point, I don't question your facts since you have undoubtedly tested them in a plant, but I would think that that 1/273 difference which you speak of should be applied to the entire volume, possibly 70 cubic centimeters of the large bulb, and that might make a difference of perhaps 50 per cent in the small quantity which you are actually measuring.

Dr. Feibelmann: The volume of the air enclosed in the flask need not be considered, this could be 70 cc. or that big (indicating) .10 cc. of the vat consume a certain weight of oxygen that has a certain volume measured by the water, which is sucked into the flask after the oxidation has taken place. The influence of temperature therefore affects only the few cubic centimeters that we measure. Of course the temperature of the enclosed air must be constant during the reaction, otherwise the temperature influence would be too disturbing and the result not reliable. In this direction you are right. In order to avoid this influence the neck of the flask is provided with a thick layer of cork so that the shaking hand does not warm the flask. If you are afraid that there might be too big a difference or influence on account of the temperature, you can easily put the apparatus in a pail of water of a constant temperature which may be kept in the dyehouse or laboratory. You shake the flask in the water until you think it has the same temperature as in the beginning of the test. Then, of course, you can absolutely eliminate this possible source of inaccuracy.

I might add at this point that the divisions of the scale of the Vatometer are not cubic centimeters nor is it empirically made. We transfer a gas volume into a weight, namely grams, as we want to know how many grams of sodium hydrosulfite per liter correspond to our vat. One gram molecule of any gas always has a volume of 22.4 liters, or, as one molecule of oxygen consists of two atoms, one atom oxygen which weighs 16 grams, has a volume of 11.2 liters. Further: the 10 cc. of the vat we have under test consume only some cubic centimeters oxygen. Therefore the volume of our scale must be 11.2 cc. divided in 10 parts. Thus 1 gram hydrosulfite in the vat is expressed by 1.12 cc. or 1 scale interval.

Mr. Schmeidler: Is the scale completely uniform the whole way?

Dr. Feibelmann: Practically.

Mr. Schmeidler: No, I mean you don't allow, do you, for the varying pressures due to the different columns of water under which the gas is?

Dr. Feibelmann: No, that is not necessary.

Mr. Zisman: What is the type of substance that you use for the indicator in the Hydrosulfometer?

Dr. Feibelmann: I forgot to mention that. Of course, it is no secret. It is a solution of ferric chloride which contains a small amount of ammonium thiocyanate. You know, ferric thiocyanate is red, while ferrous thyocyanate is colorless. If the ferric ion is reduced to the ferrous ion by the hydrosulfite the ferric thiocyanate vanishes and the color pales. The concentration of the measuring solution is empirically according to the cylinder and its scale; this solution contains 21.6 grams metallic ferrum per liter.

Mr. Schmeidler: Is there no reaction between the ferric ion and the bisulfite?

Dr. Feibelmann: No. At least not in such a speed that the titration would be troubled.

Mr. Schmeidler: You measure only the sulphoxylate?

Dr. Feibelmann: Yes. But your question leads me to another point; if you were to analyze formaldehyde sulfoxylate, you would not find such a sudden end of the titration, because formaldehyde reduces the ferric thiocyanate too, although more slowly. Therefore it requires some experience to be able to recognize the end of the titration of the sulfoxylate.

Mr. Amick: Would it help if you heated the solution?

Dr. Feibelmann: For what purpose?

Mr. Amick: For the purpose of determining the formaldehyde-sulfoxylate.

Dr. Feibelmann: You mean to evaporate the formaldehyde?

Mr. Amick: No, to get the reaction a little more rapidly.

Dr. Feibelmann: That would not be practical and is not necessary as the reaction between the sulfoxylate and the ferric ion is rapid enough and the heat would also accelerate the reaction with formaldehyde. I think it would be better to add a chemical which binds formaldehyde, for instance aniline salt or ammonium chloride. But I did not try that. The determination of formaldehyde-sulfoxylate is, of course, not important, because this material is rather stable.

Mr. Kopatch: Could potassium permanganate be used?

Dr. Feibelmann: No, because that is reduced by sodium bisulfite, too.

Mr. Dogin: You couldn't measure, could you, other substances used in the dyehouse, for instance, perborate of soda, sodium peroxide, hydrogen peroxide?

Dr. Feibelmann: Yes, of course. What you have mentioned are so-called oxygen compounds. It is very simple to measure these, and I have designed a similar apparatus for that, also for the determination of the available chlorine in hypochlorite solutions.

Mr. Clark: As a practical question, suppose we have been dyeing cloth in a dyebath for a certain length of time and part of the dye has been exhausted from that dyebath onto the cloth—I am speaking of jig dyeing particularly—and we don't know how much dye is left at the present time. Could we test that solution with this instrument? I mean, is it going to show the excess hydrosulfite that is there, or the amount that is combined with the dyestuff? In other words: how much excess hydrosulfite have we got over that that is actually combined with the dyestuff at that particular moment. Can we determine that by this test?

Dr. Feibelmann: No, it gives only the sum of the hydrosulfite consumed by the dyestuff present at that moment plus the surplus.

Mr. Clark: At that point we don't know how much dyestuff is in there?

Dr. Feibelmann: No. That is a matter of experience. You know, if you have a continuous vat, you dye so many pieces in that volume. You know about how much dyestuff you must add.

Mr. Clark: This is the way we do it now: after the dyeing operation has been going on a certain length of time we test with Indanthrene yellow paper, by dipping it in, but we would like to have a more exact way of finding out how much hydrosulfite we have in there. But you say that won't tell us that?

Dr. Feibelmann: Your yellow paper tells you nothing. It says nothing because you can only see that there is a reducing power, but it says nothing about the amount of dyestuff or hydrosulfite.

Mr. Clark: It is a qualitative test. We want something quantitative to tell us.

Dr. Feibelmann: The quantity of the entire reducing value is given by this Vatometer but it does not tell how this reducing value is divided between the dyestuff and the surplus. I know another hand test. For instance, a man observes on a glass-plate, which he had dipped in the vat, how fast it oxidizes. I don't know whether that method is used here; it is used in Germany. These are very coarse methods that indicate nothing about the actual hydrosulfite content of the vat.

Chairman Baxter: I am sure these have been very interesting questions, but it seems as though there should be more. Are there any further questions you gentlemen would like to ask Dr. Feibelmann?

Mr. Zisman: I have one more question. Is the Vatometer suitable for the glucose vats?

Dr. Feibelmann: Yes. The glucose vat is much more important for the continuous vat than for actual dyeing, and you know that glucose is also a reducing agent in the alkaline vat. Glucose also consumes oxygen, but at a much slower rate than the vat. You get a first result after the 10 cc. of vat are oxidized which easily can be observed by the change of the color. If you then continue shaking

the apparatus for about one minute and fill water in the tube until the former level or value you will see that the level sinks a little or that a little more oxygen is consumed and so on. You take only the first result. The oxidation of hydrosulfite and glucose can easily be distinguished and the Vatometer can be used for that purpose without any difficulty.

Mr. Gerry: Could this method or a similar method be used for determining the amount of formaldehyde-sulfoxylate in vat print colors?

Dr. Feibelmann: Of course, it should be possible; I have not tried it. But it is to be considered that formaldehyde-sulfoxylate as such cannot be determined in the Vatometer as this stable compound does not oxidize itself by the air at the ordinary temperature. If the formaldehyde-sulfoxylate first will be decomposed in sulfoxylate and formaldehyde, for instance by the addition of an acid, it should be possible to determine also the reducing value of a printing paste in the Vatometer. A print color that does not contain the dyestuff would better be determined with the Hydrosulfometer. I shall try this, it is very interesting.

Chairman Baxter: Are there any other questions? If not, I suggest that we give Dr. Feibelmann a rising vote of thanks for his wonderful talk.

. . . A rising vote of thanks was extended to Dr Feibelmann . . .

THIRD ANNUAL JOINT OUTING

THE Third Annual Joint Sectional Outing of the Piedmont, South Central and Southeastern Sections will be held on August 14th and 15th at Signal Mountain Hotel near Chattanooga, Tenn. R. S. Wheeler is chairman of the outing committee and Robert Cowan is secretary. Persons who plan to attend should make reservations directly with the hotel. Included in the program are the following events: *Friday, August 14th*: 2:00 to 5:00 P.M., Suds and Pretzels; 4:00 to 6:00 P.M., Swimming and Diving Contests; 4:00 to 7:00 P.M., Lawn Concert; 8:30 P.M., Hangar Dance. *Saturday, August 15th*: 10:00 A.M., Games and Contests for Prizes, Ladies and Men; 11:00 A. M., Musicale; 2:00 P.M., Bridge Party; 2:00 P.M., Golf Tournament; 5:00 P.M., Lawn Fiesta; 7:00 P.M., Banquet, Floor Show, Awarding of Golf and Contest Prizes and Lottery Drawing for Prizes; 9:30 P.M., Hangar Dance and Forest Room Dance.

OUTING, RHODE ISLAND SECTION

THE fifth annual outing was held on June 19th, 1936 at the Warwick Country Club, with approximately ninety members and guests present. A. Newton Graves, chairman of the outing committee, was responsible for a well planned day which was greatly enjoyed by everyone. The coveted golf trophy was won by Thorwald H. Larson with a low gross score of 76. Several other golf prizes and also a number of door prizes were awarded. In the evening an excellent dinner was served at the club house. This was followed by a short business session which was presided over by chairman John G. Masson. The following officers were elected to serve for the coming year:

Chairman, John G. Masson.

Vice-chairman, Richard Haworth.

Treasurer, Robert R. Farwell.

Secretary, Raymond A. Pingree.

Councilor, Ben Verity.

Sectional Committee: Peter J. Ariente, Richard B. Earle, Philip C. Putnam, Albro N. Dana.

Member of National Nominating Committee, Ben Verity.

The meeting was adjourned at approximately 10:00 P. M.

Respectfully submitted,

RAYMOND A. PINGREE, *Secretary*.

Annual Meeting and Convention

December 4th and 5th

Providence, R. I.

Auspices, R. I. Section

Calendar of Coming Events

Third Annual Joint Outing, Piedmont, South Central and Southeastern Sections, Signal Mountain Hotel, near Chattanooga, Tenn., August 14th and 15th.

* * *

Annual Meeting, Providence, R. I., December 4th and 5th.

AMERICAN
DYESTUFF
REPORTER

LOUIS A. OLNEY, Sc.D.
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor
A. P. HOWES, Publisher
NORMAN A. JOHNSON
Managing Editor
MYRON DREW REESER
Advertising Manager
Published biweekly by
HOWES PUBLISHING CO., INC.
440 Fourth Avenue, New York City

Subscription price: $5.00 per year; Canadian $6.80; foreign $6.00

Vol. 25 July 27, 1936 No. 15

TECHNICAL NOTES

WE HAVE recently received a suggestion (upon a typed postcard, signed "Reader"), commenting upon the fact that our "abstracts" are from two to three years out of date, and proposing that we hereafter keep them reasonably up-to-date, as is the case with the abstracts in the *Textile Journal, Chemical Abstracts,* etc. We have, from time to time, received other comments upon the columns in question, though most of them of a decidedly appreciative nature, and signed with the name of the reader. It seems to us that the point made by "Reader" is a worthwhile one and it is unfortunate that his postal was of such a nature that he was ashamed to sign his name to it. It has been considered by us more than once. But, as it involves a complete misunderstanding of the purpose of our "Technical Notes," it seems well to explain just what policy we are pursuing in the "Technical Notes."

The "Notes" are *not* abstracts, but reviews, or rather reports. They are by no means intended to cite all articles published in the different textile journals. The various publications coming to our hands are read (all of them), carefully considered as to their possible value to some among the large number of textile workers, oftentimes carefully tested as to the facts or methods cited (this point should be seriously noted), and finally, if apparently of interest or value, are, not abstracted, but noted and often discussed or commented upon. There are many articles considered, studied, and subjected to laboratory test, which prove to be of too little value for "Technical Notes," and which do not, therefore, appear in our columns.

Now, such a process of evaluation obviously does not allow of rapid publication. An abstract can be prepared and printed within a month of the receipt of the article, but it can be only a brief repetition of what the author has stated or claimed, whether accurately or carelessly, fundamentally or superfically.

We have, now and then, considered the possible value of an abstract section, in the strict and also ordinary sense of the word. But there is more than one periodical, such as the *Journal of the Textile Institute, Journal of the Society of Dyers and Colourists, Chemical Abstracts,* the *Centralblatt,* etc., which are performing this task satisfactorily. There is no other journal except the DYESTUFF REPORTER, we believe, which is doing the special and purposeful work of our "Technical Notes." An abstract section in the DYESTUFF REPORTER would, we believe, be an unnecessary duplication of work which is being well carried on by other journals. We feel, therefore, that "Technical Notes" should be considered from the viewpoint set forth above, and duly appreciated upon that basis.

We do not mean to hint that we are not receptive to suggestions as to possible improvement of either the "Technical Notes" or any other section of the AMERICAN DYESTUFF REPORTER. Any such suggestions will be gladly received, thoughtfully considered, and, if possible, acted upon.

Only, we hope that our readers will not allow their laudable modesty to keep them from letting us know who they are. When we know what friend is making a suggestion, we are more likely to give the suggestion careful thought.

Annual Meeting

PLANS are now being made for the Sixteenth Annual Meeting and Convention of the American Association of Textile Chemists and Colorists to be held this year in Providence, R. I., on December 4th and 5th. The Rhode Island Section will officiate as hosts this time and all details of arrangements are in the hands of the committees appointed by this section. Although there is still considerable time to elapse before the meeting actually takes place it is important that members of the Association keep the date and place in mind and to start now to make plans to be among those present. Judging from past meetings, there is no doubt but what the event will be well worth while for all who can possibly arrange to attend.

ERNEST S. WITTNEBEL

ERNEST S. WITTNEBEL, president of the Commonwealth Color & Chemical Co., died recently in New Rochelle Hospital at the age of 58. He was born in New Jersey and after graduation from college was active as a chemist in various laboratories. About 35 years ago he started in the dyestuff business and founded the Commonwealth company.

Mr. Wittnebel was well known for his interest in fishing and much of his spare time was devoted to this sport. He was for many years a member of the New York Athletic Club and last year he organized the N.Y.A.C. Anglers.

He is survived by his widow, Mrs. Elsa Wittnebel and a son, Augustus S. Wittnebel. Funeral services were held at the Davis Memorial Parlor in New Rochelle, N. Y.

Recent Research on Cellulose Fibers*–II

(Continued from July 13th issue)

Nature of the Cotton Cuticle–Membrane Systems Within Fibers–The Question of Cross Walls in Cotton

SOME of the interesting and more or less surprising new ideas on cellulose, particularly on cotton, may be misleading because the papers presenting them do not all give due emphasis to contrary views. Recent research, particularly foreign contributions, shows clearly, that in spite of the great amount that has been done, there is not yet general agreement on fibers, even on some of their properties and structural parts which are of great importance in manufacturing and processing.

Among the more startling ideas, it has been proposed that the cellulose is really not the framework of the fiber; and that the strength of a cellulose fiber does not reside in the crystalline cellulose, the part having the most definite and systematic structure, but in non-cellulose materials within it.

Offhand such ideas may seem far fetched and incorrect but they have been offered seriously on the basis of evidence. It is hardly time yet to pass a final judgement on the various opinions but it is interesting and of some value to know about them.

Since the cuticle is the outside of the cotton fiber it is one of the most important parts. The views presented in the first article of this group are not the whole story, at least as far as opinions are concerned, although they seem to cover the case fairly well for processing.

In Osborne's recent review[1] the cuticle, as generally understood up to that time was described as an outer layer much thinner than the outer (primary) layer of cellulose, grown firmly to it, not detectable directly in the microscope but brought out by stains for non-cellulose material.

In some cases it seems that there must be confusion in the literature between cuticle and primary wall.

Most of us have probably thought of the cuticle as being a rather definite uniform resistant layer but Kuesebauch[2] reports as a result of color tests that in many fibers the cuticle is not present over the whole surface or, if present, it sometimes varies in thickness. In any swelling treatment the action begins where the cuticle is thin or lacking.

Speaking in general terms, basic dyes stain the cuticle of cotton in proportion to the amount originally present or to the amount remaining from processing or chemical treatment. For example the Victoria Blue test can be used to determine whether or not bleached cotton has also been kier boiled.

BEHAVIOR UPON EXTREME SWELLING

The behavior of cotton upon extreme swelling is of special value in the study of fiber structure and there is still an interesting discussion as to just how the bead effects which are seen in fibers swollen by cuprammonium solution are brought about. When the fiber reaches the bursting point from the pressure of swelling, the outer fiber layer might split around and break into a number of rings, or it might split lengthwise or spirally. Since the split cuticle in the latter case might wrap around the fiber, either form of splitting might cause bead effects. These two views may be the cause of some of the variety seen in the illustrations of highly swollen fibers. In fact it is easy to see evidence for both types of effect when swelling cotton fibers under the microscope.

Hess,[3] in search of better evidence, fastened fibers at their ends so that they could not twist. Then, upon swelling there were no bead effects. The reagent apparently entered through fissures in the cuticle or by diffusion through it. When sufficiently swollen the cuticle split lengthwise and separated as a band.

When, on the other hand, the fiber is free to move, the cuticle cracks in the same way but winds around the rapidly swelling fiber substance. It may wrap several times and look like a ring, but usually each ring can be seen to be joined to the next showing that the result is really due to spiral winding.

All of this would be taken as definite evidence of a real cuticle of skin-like nature but Haller has come along with other evidence that the effects may be due after all only to impurities. Using regenerated cellulose where there can not possibly be a natural cuticle, he has deposited foreign material on the outsides of filaments and this has caused them to swell in bead forms like cotton. Since the normal filaments did not swell in this way there can be no question of fiber layers or structure. The foreign material interfered with the swelling and caused the bead effects. Reasoning in the same way the foreign material in the cotton cuticle, rather than any peculiarity of fiber structure, would be the cause of its characteristic bead appearance upon swelling.

MEMBRANES WITHIN CELLULOSE FIBERS

The idea that the cellulose proper is actually of less importance in determining the physical behavior of the fiber than non-cellulose "incrusting" substances and membranes, is contrary to current views of cellulose fibers, whose properties have been explained as largely due to their greater or less degree of crystallinity.

Such a conclusion can hardly be fully accepted yet but there is evidence for it. Since the work leading up to it has been done very largely on cellulose fibers other than cotton some caution should be observed in applying the results to cotton even though they seem applicable to the other fibers.

The idea is that a non-cellulose membrane structure extends all through cellulose fibers, recently brought into prominence by Luedtke. His views as set forth in various publications seem, in general, to be rather widely accepted. They were reviewed by Heuser in the AMERICAN DYESTUFF REPORTER[4] and will be only briefly sketched here.

Luedtke regards any cellulose fiber as divided into small "parcels" by membranes which extend through it in a systematic manner in various directions. Some of them extend through the cross section dividing the fiber into short lengths; others divide it into concentric layers; and still others radially, so that the planes intersecting a cross section would suggest a target with many rings, cut like a pie into many narrow pieces. He also has them around the outside and lining the central canal and altogether he emphasizes the membranes to the extent of considering them, instead of the cellulose, the framework of the fiber.

This structure was worked out first for bamboo. It seems to apply to textile bast fibers like flax and, according to Luedtke it applies also to cotton. However, the fact that cotton is of such a different growth immediately raises a doubt and its study has been taken up by other investigators.

Incidentally, the other cellulose fibers such as hemp and ramie ought also to be studied in greater detail, because they are evidently not all constructed in exactly the same way although they may have the same general character as bamboo.

Coming back to cotton, a feature that has aroused special discussion is the alleged cross elements, claimed to be non-cellulose membranes extending entirely across the fiber at frequent intervals. Hess is supposed to have verified their presence in bast fibers but doubts whether they have been proved to exist in cotton. If they do exist in cotton it is not a continuous cellulose fiber but consists of a length of cellulose, a membrane, another length of cellulose and so on.

Luedtke goes so far as to believe that the cross elements are the cause of the bead effects shown by fibers which are swollen in cuprammonium and similar reagents and which we have just explained in other ways. If the cross walls did not swell while the surrounding cellulose did, they might account for the constriction in the swollen fibers. In fact it is claimed for some fibers that the individual "parcels" or subdivisions set off by the various membranes swell separately in copper reagents to bead-like forms.

CROSS WALLS IN COTTON

If there are any such cross membranes in cotton fibers there should be some way of identifying them and proving their presence. However, attempts to isolate them and determine their nature have not gone far enough for general acceptance of such conclusions as have been reached.

As a part of this quest Sakostschikoff[6] has published data on a method of swelling cotton in concentrated sulfuric acid, suddenly stopping the action by ice water, and examination of the residue. He claims to find and to be able to isolate cross section elements as minute discs with holes in them for the lumen.

Not only does he find them in cotton but claims to be able to obtain them from nitrated cotton and rayon. Altogether he has presented an interesting and rather convincing story and goes so far as to relate the number and size of the membranes with the character and properties of the cotton.

However, the evidence is tenuous and the so-called cross membranes have been plausibly explained as being due merely to bits of residual unattacked cellulose.

Haller[5] has tried to repeat the work of Sokostschikoff and reported that the structures found in some bast fibers are entirely missing in cotton or could only with some imagination be considered cross membranes. They responded to tests like unmodified cellulose and not like foreign material.

He obtained especially ingenious and striking evidence from modified cellulose fibers. Immunized yarn has the outer layer of each individual fiber chemically converted while the core is unchanged cellulose. In a sense, therefore, the fiber has been provided with an artificial cuticle and such modified fibers swell like natural fibers in copper reagents. The cross elements might still be present as far as this treatment is concerned on cotton.

However, a *regenerated cellulose* fiber can be given a modified layer or cuticle in the same way. After a cuprammonium rayon of approximately round cross-section was immunized it swelled very much like a cotton fiber in copper reagents. If treated by the method of Sakostschikoff these fibers behaved very much like cotton under the same conditions. Since there is no chance of regularly arranged cross elements in the rayon it is concluded that they are extremely unlikely in the cotton; and that the appearance which suggests them is due to cellulose not yet attacked by the sulfuric acid.

Thus the membrane idea seems to have been disposed of for cotton and the true cellulose structure is the important thing after all. But, against the simple cellulose explanation is the claim that the membranes are insoluble in a copper reagent, and they could be identified in cuprammonium rayon and were apparently identical with those from raw or bleached cotton. Similarly these structures

have been recovered from viscose rayon. They were not affected by the reactions but went through the process as unchanged morphological elements. They have also been obtained from nitro silk and from cellulose acetate. (Sakostschikoff.) It would seem quite impossible that they could survive the vigorous action of these various treatments if they were merely bits of native cellulose.

Considering membranes in other directions, cotton fibers are built up from concentric layers, a point on which all seem to agree. The layers are believed to represent areas of slightly different structure due to the interruptions of growth between day and night rather than to any appreciable amount of foreign material. The concentric layers of bast fibers are apparently separated by definite layers or membranes of some other material.

Haller has applied a novel method which seems to show definitely that there are dividing membranes in some cellulose fibers but not in cotton. He made use of his so-called dye condensation method which is fundamentally the same as "blinding" as described in British publications.

For example flax was dyed with Naphthol AS-Fast Scarlet Base B. Upon soaping and subsequent swelling in a copper reagent it was found that the soaping had caused the dye to migrate and it had concentrated at certain planes which showed clearly. They were apparently Luedtke's membranes, through which the dye could not pass. Part of them were cross elements and part extended lengthwise of the fiber.

With cotton fibers, on the other hand, the dye travels to the lumen and does not collect at any planes within the fiber. Hence the conclusion that there are no membranes like those in the bast fibers and that the bulk of the cotton fiber wall is essentially homogeneous throughout even though it consists of layers of fibrils.

Nothing final has been learned about the chemical composition of the membrane system. There is a reaction something like lignin but it is not shown by cotton.

We can only say now that there is a fairly good case for the membranes in bast fibers where they seem to have grown into the fiber in a very important way but really no conclusive evidence that they exist in cotton.

References

[1]G. Gordon Osborne has written one of the best recent summaries of our present knowledge of the structure of cotton under the title of Micro-Analysis of Textile Fibers. Part III. Observations on the Structure of Cotton, and published in Textile Research *5*, 275 and 307 (1935).

[2]Karl Kuesebauch, Textilberichte *17*, 18 (1936).

[3]K. Hess, Cellulosechemie *12*, 95 (1931).

[4]E. Heuser, American Dyestuff Reporter, March 19, 1936, page 135.

[5]R. Haller, Helv. Chem. Acta. *18*, 800 (1935).

[6]Sokostschikoff and Tumarkin, Textilberichte *16*, 214, 356, 499 (1935).

(To be concluded)

Finishing of Textile Fabrics*

Chemistry and Application of Principal Ingredients

By F. G. LA PIANA†

VERY often a sample or a swatch of finished cloth is sent to the finisher with the request that the finish be matched on a lot of goods. This is by no means an easy job. As previously stated, the effects produced in finishing are due as much to the equipment at the disposal of the finisher and to his dexterity in making use of it as to any particular ingredient he may use in his recipe. Furthermore, while starches, dextrines, oils, waxes, can be quantitatively determined in a finished piece of cloth with a fair degree of accuracy, it is almost impossible to determine by analysis the nature of the starch or starch derivatives which have been used to obtain the finish, on account of the gelatinization and disruption of the starch granules by the boiling operation. Therefore, a chemical analysis of a piece of cloth and of its finish may have little or no practical value unless the analyst has expert practical knowledge and can correlate the results of the analysis with a thorough physical examination and appearance of the cloth.

I will not attempt to go into details of any particular finish. I will try to give you a general idea of the main subdivisions into which practically all finishes may be classified according to the specific properties, appearance, body and hand which the finisher intends to give to the cloth.

BACK FILLING

Under this name are grouped some finishes applied to a large variety of cloths with the purpose of filling the spaces between the threads. As the name implies the finish is applied only to a face of the cloth. In fully back-filled goods, the surface of the cloth assumes the appearance of a continuous and even structure more or less like paper with no pin-holes or air spaces. For this finish, thick boiling corn starch is principally used and large amounts of insoluble finely powdered mineral fillers,

*Portion of an address delivered recently before Committee D-13 of the American Society for Testing Materials. Reprinted from *Canadian Textile Journal.*

†Stein, Hall & Co.

like China clay, talc, etc. In the better grade of goods, part of the corn starch may be replaced with advantage by potato or wheat starch. Medium grades of tapioca flour, not too stringy, are satisfactory especially in mixture with corn starch. High grade flours due to stringiness do not spread evenly and should not be recommended unless especially treated to alter this quality. To better bind the filler, so it will not dust off when the goods are folded and handled, a good adhesive binder is added. Rosin size is often recommended for this purpose, but a well converted light colored dextrine especially if made from tapioca flour will serve the same purpose. To reduce the boardy effect that the large amount of starch imparts to the goods, soluble tallow, soluble waxes, or cream softener is added to this mixture. Care must be taken not to add too much softener, as they have a tendency to weaken the strength and the adhesiveness of the starch film as previously explained, and may so increase the dusting off of the finish.

WEIGHTING

Of course, back-filling increases enormously the weight of the cloth, but very often it is required to increase the weight without altering the appearance of the surface. In this case, soluble salts like epsom salts, Glauber salts, common salts, glucose or sugars take the place of the insoluble fillers. To obtain the best results, they must be used in highly concentrated solutions, and in the case of salts to eliminate the changes of crystallization with consequent disruption of the fibers, it is advisable to add a certain amount of dextrine as a protective colloid. It often happens that colored goods of this class dyed with vat dyes and finished with glucose, sugars or highly soluble dextrines change shade when the finish is applied, especially if the mixture happens to be on the alkaline side. This is due to the reducing action of these materials on the dyestuff. In this case, it is advisable, if possible, to turn the mixture on the acid side by the addition of some mild organic acid such as acetic. Sometimes it is necessary to change to some form of oxidized starch, with none or very low content of reducing matter.

STIFFENING

All finishes in which starches or dextrines are used impart more or less stiffness to the goods. In many cases, this is not the object intended and often after the finish is applied, the goods are run through braking irons or buttons or other special apparatus which breaks the starch film into minute particles and renders the goods soft and pliable again. Of course, the addition of oils, softeners, waxes and fats reduces this stiffness, too. In other cases, stiffening is practically the only object of the finish. In this case, very thin boiling corn starch or partially soluble white corn dextrine in concentrated solutions give the best results. When filling as well as stiffening of the cloth is desired, mixtures of thick boiling and thin boiling starches are indicated; wheat starch is superior to corn starch for this purpose. If less filling and more penetration is desired, tapioca flour is substituted. While for plain starching and filling, thick boiling starches should be cooked only to 180-185° F., for stiffening they should be boiled at 212° F.

PURE STARCHING

A large variety of especial finishes is grouped under this name. While in some of these finishes a partial filling or stiffening may be required, the principal, and in most cases, the only object is to impart to the goods a more substantial hand without affecting their pliability or draping qualities or the special appearance which has been given or is going to be given to the surface through purely mechanical treatment. For this purpose, thick boiling starches in diluted solutions with the addition of oily or waxy softeners of some kind are used. The quality and grades of the goods, and more often the cost of the finish are the determining factors as to which one of the many starches to choose. Generally in the esteem of the finisher, potato starch is first, wheat, tapioca, corn and sago next in the order named. Of course, very often some special quality desired changes or reverses the order. For example in finishing black dyed piece goods sago seems to be especially useful.

SHEER GOODS

This class of materials, which includes the best grades of dress goods such as voiles, lawns, organdies, etc., is the one in which lately the tendency has been to eliminate the use of starchy materials. Some new finishes have been developed such as anti-crease finish, and some more or less permanent finishes. It is too early yet to express a definite opinion of the value of these finishes as more or less they are still in the formative stage. In general it may be said that there exists a demand for finishes that will stand laundering and dry cleaning. In certain types of wearing apparel an anti-crease quality would be a decided improvement. Waterproofing and spot proofing are important, too, and for woolens and furs and rugs permanent mothproofing. When these goods are finished with starchy materials, only high grade gums and dextrines are used. Potato dextrines and tapioca dextrines of different degrees of solubility and conversion to suit the different requirements are the best.

RAYONS

Except in some cheap linings and twills, rayons are finished without any addition of any starch or gum. They depend to attract the attention of the buyer mostly on design, luster, coloring or novelty in the weave. In light construction where the ends are few and not enough to hold the threads in place without slipping, it may be necessary to add a little gum to the finish.

And now about one of the recent innovations in the finishing game, that of sanforizing or preshrinking. The sanforizing process takes place as the last operation in the finishing and is intended to release the fibers from all tension so that the cloth may shrink to its natural dimensions before the garment is cut and no more shrinkage may take place in the garment itself. I suppose you are familiar with this process; and will only mention the fact

that this shrinking takes place in the space of a minute or two according to the speed of the machine, and unless the fibers are so conditioned that they will absorb moisture, almost immediately, the operation is a failure. For this simple reason it has been necessary to change or modify nearly all the finishes usually applied to this class of goods. Thick starches which cover and fill the cloth must not be used. Gum and dextrines which easily remoisten and become sticky must be eliminated. Otherwise they gum the hot electrical shoes. Fats, oils, and tallow and materials that repell water must be kept out as much as possible. Thin boiling starches, specially prepared starches that disperse well and leave the surface of the fibers exposed, liberal use of glycerine or other hygroscopic material, and wetting out agents are recommended. These are general rules, of course, but as the types of cloth that are sanforized are very many, ranging from coarse denims to the finest broad cloth, it would be useless to go into more detail. Each finish must be analyzed on its merits and changed accordingly to suit the cloth and the process at the same time.

Technical Notes from Foreign Sources

Variations in Color-tone in Dyeing Acetate Silk

Dr. Karl Lauer—Monats. f. Textil-Ind. 49, pp. 42 and 65 (1934).—The present paper is the result of work carried out in the Organic and the Physical departments of the German Technical High School in Prague.

The author refers to a previous paper (Kolloid-Ztschr. 61, 91 (1932).

The following points have been established. The sulfonates of benzene, naphthalene, 1-isopropyl-naphthalene, anthracene, phenanthrene, and carbazole, increase the stability and the degree of dispersion of dyestuffs in suspension. The sulfonates are also taken up by the acetate silk, so that a decision cannot be reached as to whether a case of solution in the fiber, or one of adsorption, is involved. In any case, however, the taking up of the sulfonate by the fiber slows down the rate of dyeing, so that the dyeings come out more level, a factor in the process not noticed as it deserves, the reason for the use of sulfonates being only, in the first case, to get the (solid pigment) dyestuffs dispersed.

Beside their superficially active, favorable effect, an alteration of the proper color-tone by the sulfonates has been often observed—a very strong and striking alteration, and necessarily estimated as unfavorable. For the experimental work, the dyestuffs chosen were the two amino-anthraquinones, and 1-4-diamino-anthraquinone. The dyeings from 1-amino-anthraquinone without addition of a sulfonate are orange-yellow, those of 2-amino-anthraquinone yellow, those from 1-4-diamino-anthraquinone bluish-violet. But, if the dyeings are carried out in the presence of sulfonates, the colors are yellow, greenish-yellow, and reddish-violet respectively; tones which differ so sharply from the former, the expected ones, that it would be supposed that quite different dyestuffs were being dealt with. Obviously, only dyeings of equal depth were compared. The depth or strength of the dyeings could not be estimated by ocular examination; the different samples were determined by dissolving definite weighed amounts of the dyed fiber in acetone, and subjecting the solutions to colorimetric measurement. In these solutions the differences in color spoken of were not perceptible.

The cause of this phenomenon might be sought in various directions. The color of different strongly dispersed suspensions of the same substance is frequently different, and usually, with further subdivision of particle, a displacement of the color toward the red end of the spectrum is to be observed. Since, however, in the taking up of the dyestuff by the acetate silk, we have a case of pure solution, this possibility of a colloidal solution of the dyestuff in the fiber was excluded.

That the phenomenon could not be due to a case of pure surface-tension was shown by careful microscopic studies of the dyed fibers which displayed general uniformity of surface condition in all dyeings made under the same conditions, and uniform, but tonally different, perfect dyeing completely through the fiber. The material, of course, had to be washed thoroughly after dyeing, since distinct amounts of dyestuff were held fast upon the surface of the fiber by adsorption, and these would form a disturbing factor in the examination of the material under the microscope.

A table is given, of analyses of the sulfonates employed. The results show that neither ionic adsorption nor reciprocal adsorption take place. The solutions of the sulfonates used were exactly neutral, and remained so during the whole course of the experiments. (It might be added, for clarity, that the method of examination consisted in analysis of the sulfonate solutions for Na and S before treatment of the acetate silk samples in them, and again after the treatment, the figures showing that the sulfonates remained wholly as sulfonates after "reaction" with the fiber.)

The preceding is the substance of the first part of the paper. The section goes on to discuss the fact that the color of solutions of the amino-anthraquinones in various solvents is quite different—a fact throwing some light upon the problem in question. Three sets of graphs are

given of the absorption-curves of the three amino-anthraquinones under discussion, in various solvents, which show plainly a simple connection between the color-tone of the solvent and the dielectric constant of the solvent. This connection is briefly discussed, and the conclusion drawn that the alteration of the color-tone of the dyeings, in dyeing in the presence of sulfonates, may find its cause in the fact that the sulfonates dissolve in the fiber, through which a new mixed solvent—fiber-sulfonate—with a new dielectric constant, is formed. The color of the dyeings therefore does not simply happen to change, but must change, and in a regular way. Actually, by use of mixtures of solvents, one is in a position to produce any desired color-tone between the two possible limits.

All attempts to alter the color-tone of solutions, through simultaneous dissolving of dyestuff and sulfonate in the most different organic solvents, were unsuccessful. Above all, solvents were naturally chosen, whose structure is similar to that of cellulose acetate—acetic ester, acetacetic ester, acetone, alcohol, etc. The solubility of the dry sulfonates in the solvents chosen is naturally very low; so that possibly on this account a visible action was lacking. But the solubility or the adsorbility as to the acetate fiber is likewise very low, according to the measurements made. It amounts to about 0.8 millimols/g. of fiber, yet, even with this really very tiny amount, a plain displacement of the color-tone is evident.

No conclusions can be drawn as to whether the taking up of the sulfonates by the acetate fiber is a case of solution or adsorption. It seems necessary to assume that the two processes overlap each other. If so, the small concentration of the sulfonates, dissolved in the fiber, must be less than just mentioned.

However, there is only one possibility of explanation of the difference in color-tone under discussion; that a part, at least, of the sulfonate dissolves in the acetate fiber, and so produces a new solvent-mixture, with its own new dielectric constant, which corresponds to the color-tone produced in the dyeing. For acetate silk, in consideration of its structure, a high dielectric constant must be assumed. In accordance with this assumption, the color of the dyeings, which are carried out without the addition of sulfonates, corresponds to the solution-colors of the amines in solvents with high dielectric constants—alcohol, acetacetic ester, acetone.

The alteration of the solution-color in different solvents has its cause in the varyingly strong polar structure of the solvent, which expresses itself in the dielectric constant of the solvent, or in the polarizing action thereby brought about, and varying in magnitude, upon the molecule of the dissolved colored substance. Through the taking up of the sulfonates throughout the fiber, this polarizing action of the cellulose acetate is weakened, a fact which can be recognized by the dyeings no longer corresponding to the solution-colors in solvents with high dielectric constants, but with the colors of those in solution in solvents of a lower dielectric value—benzene or carbon tatrachloride.

Whether, in this process, dissolved or adsorbed sulfonates play the decisive part, is still under investigation. For practical work in dyeing, however, it is evident, from what has been said, that, in dyeing of acetate silk with suspension-dyestuffs (disperse dyeing), the use of aromatic sulfonic acids or their salts can, under some circumstances, give rise to alterations in color-tone from what would be expected. Especially in the case of dyeing of mixed weaves in the presence of wetting-out agents, the dyeing of acetate silk may not or will not yield the desired or expected tones. Uniform results can be obtained if the necessary conditions for dyeing to a desired tone be worked out and strictly adhered to.

The color-shift of the amino-anthraquinones in the different solvents was determined by means of a spectrophotometer by Koenig-Martens at a N/10,000 concentration against the solvent alone, for comparison. The degree of exactness was sufficient for the present purpose.

New Products—Trade Notes

● SAILS FOR EUROPE

Carle E. Truebe, general manager of the Ernst Bischoff Company, left on July 9th for an extended pleasure and business trip abroad. Accompanied by his family, Mr. Truebe will visit the important cities in France, Germany and Austria as well as the leading textile and chemical manufacturing centers where he will make a careful study of economic conditions and late developments in research. The Ernst Bischoff Company expects Mr. Truebe back to resume his regular duties sometime in late September.

● PHOTOMICROGRAPHIC EQUIPMENT

Bausch & Lomb Optical Co. has recently issued a booklet entitled "Photomicrographic Equipment" which describes methods and equipment used in this field of microscopy. Copies are available upon request.

● QUARTERLY PRICE LIST

The Quarterly Price List of the R & H Chemicals Dept. of E. I. du Pont de Nemours & Co., Inc., for July, 1936, has recently been released. Copies are available upon request.

● GENERAL RELEASES

General Dyestuff Corp. announces release of circulars on the following products. Copies of circulars are available upon request.

Fast Red GTR Base—which on Naphtol AS-ITR ground produces dyeing said to be of exceptional fastness to light, weather,

chlorine, boiling and washing. It corresponds in fastness properties to the well-known combination Naphtol AS-ITR—Fast Red ITR and is yellower in shade than the latter. Circular I. G. 1123.

Diazo Discharge Violet BD Conc.—which when diazotized and developed with Developer A, produces bluish violet shades said to be of good fastness to washing and is further said to be distinguished by its excellent dischargeability. Circular G-149.

Acid Alizarine Black RA—a new chrome black manufactured by General Aniline Works and offered to the trade by General Dyestuff Corp. It is said to be one of the few chrome blacks which can be dyed satisfactorily direct from a Glauber's salt-sulfuric acid bath. It produces a bright, bluish black, closely approaching logwood blacks. It is especially recommended by the manufacturers for dyeing piece goods, cotton and rayon effects being left perfectly clear. It is stated that it may also be used for dyeing loose material and yarn which has to stand only a moderate fulling. Circular G-147.

• ACQUIRES SOUTHERN CHEMICAL

The Southern Dyestuff Corp. has acquired the properties of the new Southern Chemical Corp. near Mount Holly, N. C., and will succeed as operator. According to John L. Crist, president of the Southern Dyestuff Corp., additional manufacturing buildings will be erected and more equipment installed soon. All assets, liabilities and personnel of the Southern Chemical Corp. have been acquired and taken over by the succeeding company.

OPEN FORUM

Rules under which this department of the REPORTER is conducted are as follows:

1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.

2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.

3. For each such reply published the Reporter will pay a minimum of $2.

4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.

5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.

6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.

Answer

37—I would appreciate information for positive identification of mildew on wool.—**L. D.**

Answer No. 2—A simple test which sometimes aids in detecting mildew is to place a piece of the material suspected, into a glass beaker, add a little distilled water, and cover with a watch glass. Allow the beaker to stand overnight at room temperature. Next morning remove the watch glass and note the odor in the beaker. If mildew is present in sufficient quantity a characteristic musty odor will be noticed.

In some cases mildew can be detected with a microscope. It has a flower-like appearance consisting of stems and branches which would be very much finer than wool fiber. To the stems are attached the spores which are round balls, or tiny spheres joined in chain-like formation or various other forms depending upon the particular type of fungus.

In cases where the mildew is not sufficiently developed to allow easy detection, it is necessary to place the suspected material under favorable conditions and allow the mildew to grow. These conditions will consist of a proper medium or food supply, high humidity, and a warm even temperature. Sabouraud's medium furnishes a satisfactory food supply and consists of:

Maltose	**4 grams**
Peptone	**1 gram**
Agar	**1.5 grams**
Water	**100 c.c.**
1 Normal Hydrochloric Acid	**2 c.c.**

This medium is dissolved and sterilized by boiling, and placed in sterile Petri dishes. It jellies on cooking. On top of the jelly in one dish place a sample of the suspected wool; in another dish place a sample of the same lot or similar lot of wool which you believe to be free from mildew. For example, in a piece of cloth containing a mildew stain, place a piece of the stained material in one dish and a piece of the unstained cloth in another dish. A number of duplicates should be run for reliable results. The dishes are now covered and placed in an oven and held at 100° F. for several days or a week. They may be examined from day to day. If the suspected wool contained mildew, the fungi should grow into a hairy mass visible to the naked eye and the musty odor should develop. The samples which were free from mildew should show no growth or odor in the same time of incubation. Mildew is characterized by many colors, the commoner ones being black, brown, yellow, and red. — Norman S. Buchan.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

CHEMICAL ENGINEER, 30, 8 years experience, 2 years Du Pont Dyeing Laboratory, wishes to enter dyehouse. Initial salary no object. Write Box No. 907, American Dyestuff Reporter, 440 Fourth Ave., New York, N.Y.

WANTED—Copy-printer, well-based in chemistry and laboratory work, should have reading knowledge of German and French. Write Box No. 914, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.